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In other areas, perhaps reflecting my own more superficial knowledge, I found less to argue with. But I do think in a book aiming to highlight topics which will feature in the MRCP examination, more than a brief paragraph on AIDS would be useful. Having made these criticisms there is much to enjoy in the slightly idiosyncratic approach in this book. It will remain popular amongst MRCP candidates when they need a break from the large standard textbooks or when a concise monograph on a specific area is not available.

PM BELL

Health for the farmer. By C F Stanford. (pp 97. No price stated). Ipswich: Farming Press Books, 1991.

This book is of major and local importance. Its subject is occupational health and safety for farmers, their wives, children and employees. It will be enlightening to them and informative to doctors and nurses who practise in the farming community. That means all doctors and nurses, predominantly agricultural as the country is. The book is practical and comprehensive. The chapters on farming accidents, climatic risks, harmful inhalants, and toxic chemicals are specially valuable. There should be no children drowning in slurry, or in swimming pools, no more unguarded circular saws, no more low electric cables over farm-yards to catch on diggers, no more tractors without protective cabs, if Doctor Stanford's book is read and studied. Heat exhaustion does occasionally occur in Ulster in hard-working farmers in a long hot summer and the advice is good. The care of children is emphasised. Farmers' wives are warned to take no part in lambing, especially when pregnant, because of the toxoplasmosis risk to the baby and the mother. Trichinosis is mentioned, not a stranger to Ulster. There was an epidemic in the Ballymena district in 1945, with 705 cases and one death. It is lucky that hydatidosis (*Echinococcus granulosus*) in Ulster is in a horse – dog cycle and not a sheep – dog cycle. Otherwise we might have had the disaster experienced by Iceland, New Zealand and the Falklands. Perhaps after studying this book farming families will stop drinking their own unpasteurised milk; unfortunately it stil goes on. Histoplasmosis is mentioned but this reviewer tried for some years to identify histoplasmosis in patients with inexplicable spotty calcification in liver and spleen but was unsuccessful. It would be worth emphasising adequate shuttering in excavations, and avoiding unstable old walls. Altogether Doctor Stanford's book is of first importance for health and safety in agriculture. He has done his country a service.

JS LOGAN

The Ulster Medical Journal, Volume 60, No. 2, October 1991.

The Ulster Medical Journal

The Journal of the Ulster Medical Society. First published in 1932.
Successor to the Transactions of the Ulster Medical Society (1884–1929), and the Transactions of the Belfast Clinical and Pathological Society (1854–1862)

The Ulster Medical Society was founded in 1862
by the amalgamation of the Belfast Medical Society (founded 1806)
and the Belfast Clinical and Pathological Society (founded 1853)

THE ULSTER MEDICAL JOURNAL

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1. Authors are reminded that concise and clearly expressed papers are those most welcomed by readers and the Editorial Board. All manuscripts are independently refereed.

2. Manuscripts should be typewritten in double spacing, with wide margins. They should be fully corrected and alterations in proof may be disallowed or charged to the author. A sample typescript showing layout is available on request from the editorial office. Three copies of each manuscript should be submitted, including tables and figures.

3. The text should indicate the purpose of the paper, and should include an introduction, sections on materials and methods, results, and a discussion relevant to the findings. A brief factual summary should be provided at the beginning of the paper.

4. Scientific measurements should be in SI units (*Units, symbols and abbreviations; a guide for biological and medical editors and authors,* 3rd ed. London: Royal Society of Medicine, 1977). Blood pressure may be expressed in mmHg and haemoglobin concentration as g/dl.

5. Tables must be kept simple and vertical lines should be avoided. Tables and illustrations must be kept to a minimum and data should not be given in both text and tables. Line drawings should be used where possible and symbols must be large enough to be legible when reduced to text size. Where possible, size of illustrations and tables should be planned so that one or more can easily fit the page size of 19·5 × 12·5 cm. Photographs and other illustrations should be unmounted, and authors may be charged for these at cost price. Authors' names and the top of the figure should be marked in soft pencil on the back.

6. References should be restricted to those really necessary and useful. This journal uses the 'Vancouver' style (see British Medical Journal 1982; **1**: 1766-70 and Lancet 1979; **1**: 429-30). Text references are numerical. Each reference should include:

   i) a list of all authors when six or less (when seven or more only the first three should be listed followed by *et al*).
   ii) the title of the article.
   iii) the title of the journal (abbreviated to the form published by Index Medicus).
   iv) the year;
   v) volume number:
   vi) first and last pages.

   eg
   McCoy GF, Dilworth GR, Yeates HA. The treatment of trochanteric fractures of the femur by the Ender method. *Ulster Med J* 1983; **52**: 136-41.

   Book references should give the author, title, edition, town of publication, name of publisher, year of publication, and, where appropriate, volume and page numbers.

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The Ulster Medical Journal, Volume 60, No. 2, pp. 259 – 262, October 1991.

Constitution of the Ulster Medical Society

ADOPTED ON THE 30TH OF MAY 1990

The Society and its Objects

1. The Society shall be called the "Ulster Medical Society".

2. a/ The object of the Society shall be to improve the care of the sick by widening, improving and developing the education and knowledge of all concerned in the pursuit of medical matters.

   b/ To this end, the Society shall arrange educational events which shall be open to all registered medical practitioners, and shall publish the Ulster Medical Journal which shall be distributed free of charge to all members of the Society and which shall be available to any other person on payment of a subscription.

3. In furtherance of such objects the Society may:

   a/ Employ any person or persons to supervise, organise and carry on the work of the Society and make all reasonable provision of pensions to or on behalf of employees and their widows and other dependants.

   b/ Arrange and provide for, or join in arranging and providing for, the holding of exhibitions, meetings, lectures, classes, seminars and training courses.

   c/ Promote and carry out, or assist in promoting and carrying out, research, surveys and investigations and publish the results thereof.

   d/ Undertake, execute, manage or assist any charitable trusts which may lawfully be undertaken, executed, managed or assisted by the Society.

   e/ Accept gifts and borrow or raise money for such objects on such terms and on such security as shall be thought fit.

   f/ Procure contributions to the Society by personal or written appeals or otherwise.

   g/ Invest the money of the Society not immediately required for such objects in or on such investments, securities or property as may be thought fit, subject nevertheless to such conditions (if any) as may for the time being be imposed or required by law.

   h/ Purchase, take on lease or in exchange, hire or otherwise acquire any property and any necessary rights and privileges and maintain and alter any buildings used by the Society.

   i/ Sell, let, mortgage, dispose of or turn to account all or any of the property or assets of the Society.

   j/ Do all such other things as are necessary for the attainment of such objects.

4. Alterations to The Constitution must have the approval of the Council, and afterwards be passed by an Annual General Meeting, or a Special Meeting summoned for the purpose, of which seven clear days' notice must be given. No amendment to the Constitution may be made which would cause the Society to cease to be a charity at law.

5. A copy of the Constitution and Bye-Laws, with all alterations thereto, shall be kept in the custody of the Honorary Secretary.

Membership of the Society

6. The Society shall consist of Fellows, Honorary Fellows, Members, and Honorary Associate Members.

   a/ All persons registered for seven or more years as medical practitioners under the Medical Acts shall be eligible for election as Fellows.

   b/ All eminent persons registered as medical practitioners under the Medical Acts who have distinguished themselves by their contribution to medicine or to medical science shall be eligible for election as Honorary Fellows.

   c/ All persons registered for less than seven years as medical practitioners under the Medical Acts shall be elegible for election as Members. Members shall automatically become Fellows seven years after the date of medical registration.

   d/ All eminent persons not registered as medical practitioners under the Medical Acts who have distinguished themselves by their contribution to medicine or to medical science shall be eligible for election as Honorary Associate Members.

Election of Fellows and Members

7. Every candidate for Fellowship or Membership of the Society shall be proposed and seconded, in writing, by two Fellows or Members of the Society. If found suitable, every such candidate shall be sent a banker's order for his/her subscription and shall have his/her name displayed on the blackboard at the next Ordinary Meeting of the Society. In the event of an objection at such meeting, the name shall be redisplayed at the Ordinary Meeting immediately following and a ballot taken, the result to be decided by a simple majority of those present who are entitled to vote. On acceptance by such meeting and on receipt by the Honorary Treasurer of the banker's order duly complete, the candidate shall be declared elected and shall have his/her name recorded in the Society's register.

Election of Honorary Fellows and Honorary Associate Members

8. Nominations for Honorary Fellowship or Honorary Associate Membership shall firstly be put before the Council, and, if approved, shall subsequently be put before an Annual General Meeting, or a Special Meeting summoned for the purpose, of which seven clear days' notice shall be given.

Resignation and Removal from the Society

9. No Fellow or Member shall be understood to have withdrawn from the Society until he/she shall have returned all property belonging to the Society, and signified his/her intention of resigning by letter addressed to the Honorary Secretary.

10. Whenever there shall appear to be cause in the opinion of the Council, for the expulsion of any member of the Society, a minute shall be made thereof, which shall be communicated in a registered letter to the member concerned a minimum of fourteen days before the next meeting of the Council. He/she shall be invited to reply, in writing, to the Council and if no satisfactory explanation be received before the next Council meeting a minute shall be submitted for the consideration of the Annual General Meeting. On the minute being put to the ballot, if two-thirds of those present who are eligible to vote, vote for it the President of the meeting shall declare the same confirmed accordingly. No proposition for the expulsion of any member shall be entertained at any meeting, either of the Society or the Council, of which due notice has not been given in the circular calling such meeting.

The Council and Officers

11. a/ The affairs of the Society shall be managed by a Council which shall consist of sixteen Council members, namely: a President, a President-Elect, an Immediate Past-President, two Vice-Presidents, an Honorary Secretary, an Honorary Assistant Secretary, an Honorary Treasurer, an Honorary Editor of the Ulster Medical Journal and six ordinary members.

    b/ Only Fellows and Honorary Fellows shall be eligible to serve as Council members.

12. The President shall be elected at an Annual General Meeting and shall enter into the title and duties of President before the 1st of November in the calendar year following his/her election and shall hold office until the installation of his/her successor. During the Presidency of his/her immediate predecessor he/she shall bear the title of President-Elect. At the end of his/her term of office as President he/she shall be designated Immediate Past-President, and shall hold office as such until succeeded by the next retiring President.

13. Each Vice-President shall be elected at an Annual General Meeting and shall hold office from the close of that meeting until the close of the Annual General Meeting in the second year after his/her election. He/she shall not be eligible for re-election.

14. The Honorary Secretary, the Honorary Assistant Secretary, the Honorary Treasurer and the Honorary Assistant Treasurer shall be elected at an Annual General Meeting and shall hold office from the close of that meeting until the close of the Annual General Meeting in the first year after their election. They shall each be elegible for re-election but none may serve for more than five successive years.

15. The ordinary members of Council shall be elected at an Annual General Meeting and shall hold office from the close of that meeting until the close of the Annual General Meeting in the third year after their election. The elections shall be organised so that two new members are elected each year. None may serve for more than three successive years.

16. Casual vacancies on Council may be filled by the Council, but any person so co-opted shall retain office only until the next Annual General Meeting and, if then elected to Council, his/her length of service shall, for the purposes of Rules 12, 13, 14 and 15, date from such Meeting.

17. At every meeting of the Council five Council members shall form a quorum. Every Council member shall have one vote and all questions shall be decided by a majority of the Council members present and voting.

18. The Honorary Secretary:
    a/ shall maintain a Register which shall record for each member of the Society, his/her name, postal address, date of registration under the Medical Acts, date of election to the Society and class of membership;
    b/ shall issue notices for all meetings of the Council and for all Special Meetings of the Society;
    c/ shall, before the beginning of each session, issue the programme of the Society's Ordinary Meetings and Annual General Meeting for such session which shall be the only notice required for such meetings;
    d/ shall attend all meetings of the Council and of the Society and record the minutes;
    e/ shall have charge of the minute book and any other documents entrusted to him/her by the Council;
    f/ shall conduct the correspondence of the Society.

19. The Honorary Assistant Secretary:
    a/ shall assist the Honorary Secretary;
    b/ shall in the absence of the Honorary Secretary, assume the duties of the Honorary Secretary.

20. The Honorary Treasurer:
    a/ shall on entering office, receive from his/her predecessor whatever balance of money is in hands;
    b/ shall pay into the Banking Accounts of the Society all monies belonging to it;
    c/ shall have charge of, and be responsible for, the custody of all deeds and documents pertaining to the finance of the Society;
    d/ shall receive all monies due, donations and bequests, and discharge all bills and demands when ordered by the Council;
    e/ shall not pay any sum of money on account of the Society without the sanction of the Council;
    f/ shall keep a printed receipt book for annual subscriptions; each receipt to be signed by him, and to be filled up with the name of the Fellow or Member paying, the sum paid, and the date when paid (banker's orders excepted);
    g/ shall present to the Council, or on request by any member of the Council, a report of the state of the funds of the Society;
    h/ shall make up and balance the accounts of the Society to the 31st of March in each year, and after that date he/she shall submit the same with the requisite vouchers to the auditors appointed by the Council.

21. The Honorary Assistant Treasurer:
    a/ shall assist the Honorary Treasurer;
    b/ shall in the absence of the Honorary Treasurer, assume the duties of the Honorary Treasurer.

22. The Honorary Treasurer shall not be considered liable for the default of any other person during the period he/she has held office.

23. The Council may summon a Special Meeting of the Society whenever they consider it necessary and must do so if requested in writing by ten or more Fellows of the Society.

The Annual General Meeting

24. The Annual General Meeting shall be held, as far as possible, in the month of May. At such Annual General Meeting the business shall include the election of officers and members of Council, the appointment of auditors, the consideration of the annual report of the Council, the consideration of the audited accounts, the consideration of the annual report of the Honorary Editor of the Ulster Medical Journal and such other matters as may be necessary.

Voting

25. Only Fellows, Honorary Fellows and Members, shall have the right to vote at Ordinary, Annual General and Special Meetings of the Society. At every Ordinary Meeting and at every Special

Meeting of the Society, ten voting members shall form a quorum. At every Annual General Meeting of the Society, five voting members shall form a quorum. At all meetings of the Society, each voting member shall have one vote and all questions shall be decided by a majority of the voting members present and voting.

Subscriptions

26. Annual subscriptions to the Society are due, in advance, on the 1st November.

27. Alterations in the rates of subscription must have the approval of the Council, and afterwards be passed by an Annual General Meeting, or a Special Meeting summoned for the purpose, of which seven clear days' notice must be given. The current rates shall be advertised in each number of the Ulster Medical Journal.

28. If a husband and wife are members of the Society they shall, on application, be entitled to pay a joint annual subscription.

29. All those members who have paid an annual subscription for 40 or more years, or who have paid an annual subscription for 20 or more years and who have reached the age of 65, shall, on application, be exempt from any further annual subscription.

30. If the subscription of any Fellow or Member shall be six months in arrear, notice, in writing, of the amount of such arrears shall be sent by the Honorary Treasurer to such Fellow or Member at his/her postal address as recorded in the Society's Register, and if such arrears shall not be paid within three months from the date of such notice, such Fellow or Member shall be regarded as having allowed his/her Fellowship or Membership to lapse, but any such Fellow or Member who shall subsequently pay his/her arrears may, at the discretion of the Council be reinstated.

Property

31. The title to all property which may be acquired by or on behalf of the Society shall be vested in a corporation lawfully entitled to act as custodian trustee or in not less than 3 individual persons who are not members of Council.

Borrowing

32. If at any time the Society in Annual General Meeting or Special Meeting summoned for the purpose, of which seven clear days' notice was give, shall pass a resolution authorising the Council to borrow money, the Council shall then be empowered to borrow for the purposes of the Society such amount of money either at one time or from time to time and at such rate of interest and in such form and manner and upon such security as shall be specified in the resolution, and the Council shall make all dispositions of the property of the Society and enter into such agreements in relation to that property as the Council may deem proper for giving security for such loans and interest. All members of the Society whether voting on such resolution or not, and all persons becoming members of the Society after the passing of such resolution, shall be deemed to have assented to the resolution as if they had voted in favour of it.

Notices

33. Any notice required by these rules to be given or sent to a member shall be deemed to have been duly given or sent on the next working day after it is posted if sent by prepaid post to the address of the member appearing in the Society's Register. Every member shall immediately give to the Honorary Secretary written notice of any change in his/her address.

Dissolution

34. If at any Ordinary Meeting or Annual General Meeting a resolution for the dissolution of the Society shall be passed by a majority of the members present and entitled to vote, and if such resolution shall be confirmed by a resolution passed by a majority of two thirds of the members present and entitled to vote at a Special Meeting summoned for the purpose, of which seven clear days' notice was given, held not less than one month after that meeting the Council shall immediately or at such future date as shall be specified in such resolution proceed to realise the property of the Society and after the discharge of all liabilities shall hand the same over to some charitable body having similar objects or to a charity selected by Council, and, upon the completion of such division, the Society shall be dissolved.

Bye Laws

35. The Council may make such bye laws for meetings of the Society and publication of the Ulster Medical Journal as it shall consider necessary.

The Ulster Medical Journal, Volume 60, No. 2, October 1991.

THE ULSTER MEDICAL SOCIETY

Whitla Medical Building
97 Lisburn Road
Belfast BT9 7BL

If you are not a member of the Ulster Medical Society, we would appeal to you to give the question of joining your consideration. The Society has been in existence since 1862 (and is the direct descendant of the Belfast Medical Society founded in 1806), and has always been active in keeping its members interested in the advances in medical science. Meetings are held at intervals of a fortnight during the winter months, and papers are contributed by members and distinguished guests. Facilities are provided for doctors to meet informally afterwards, and have a cup of tea. *The Ulster Medical Journal, the official organ of the Society, is issued to all Fellows and Members free of charge.* The Society is now housed in its own rooms in the Whitla Medical Building of Queen's University at 97 Lisburn Road (replacing the Whitla Medical Institute which had to be vacated in 1965).

May we, therefore, appeal to you to join the Ulster Medical Society, and so enable us to widen its influence and sphere of usefulness still further? A proposal form is appended; your proposer and seconder must be Fellows of the Society. If you do not know any Fellows please contact the Honorary Secretary. All persons registered as medical practitioners under the Medical Act shall be eligible for election as members of the Society (Constitution, Section VI). Temporary membership may be allowed at the discretion of the Council.

If you do not wish to become a member of the Society, will you consider entering your name as a subscriber to *The Ulster Medical Journal?* The subscription is £30.00 per annum, payable in advance to the Honorary Treasurer.

C J H LOGAN, *President.*
J I LOGAN, *Hon. Secretary.*
M E CALLENDER, *Hon. Treasurer.*

MEMBERS **£10.00.** (A Member is one who is less than seven years qualified. He or she will automatically become a Fellow seven years after qualification and be liable to the higher subscription rate).

FELLOWS — Annual subscription of Fellows **£25.00.** Husbands and wives who are both Fellows will be entitled to pay a combined subscription of **£30.00.**

All Fellows and Members of the Society who have paid subscriptions for 40 years or alternatively have been a Fellow or Member for 20 years and reached the age of 65, or more, shall on application be exempt from any further subscriptions.

TIES — Ties bearing the crest of the Society on a background of navy, maroon, green or brown may be obtained from the Honorary Treasurer.

To THE HONORARY SECRETARY,
ULSTER MEDICAL SOCIETY.

. . . . . 19 . . . .

Dear Sir,

We nominate for $\frac{\textit{Membership}}{\textit{Fellowship}}$ *of the Ulster Medical Society:—*

Name of Candidate . . . . . .

Postal Address . . . . . .

. . . . . .

Year of Qualification and Degrees . . . . . .

. . . . . .

Signature of Proposer . . . . . .

Signature of Seconder . . . . . .

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This covers one volume (two numbers) of the Journal.

To comply with the provisions of the Data Protection Act it is our duty to inform all subscribers that the mailing list for this journal is computerised.

The Ulster Medical Journal, Volume 60, No. 2, pp. 129 – 136, October 1991.

Intramedullary locking femoral nails. Experience with the AO nail

A B Fogarty, H A Yeates

Accepted 30 January 1991.

SUMMARY

The AO interlocking nail was introduced to the Ulster Hospital, Dundonald in 1988 and since then has been used in over 50 patients with femoral shaft fractures. We have reviewed 45 patients with 46 femoral shaft fractures treated between June 1988 and April 1990. These included four compound fractures and 13 comminuted fractures. The results compare favourably with other series. The union rate was 98% and there were no instances of deep infection. The alternative treatment methods available are discussed along with a review of the relevant literature.

INTRODUCTION

The practice of intramedullary nailing to treat long bone diaphyseal fractures has been with us for at least 70 years. The principles and techniques were popularised by Gerhard Küntscher of Hamburg[1] during the 2nd World War and the method was eagerly adopted by orthopaedic surgeons worldwide. The "K" nail was generally inserted using an open technique although Küntscher himself was a keen advocate of the closed method. "K" nails are of course limited in their use to certain types of shaft fractures. Fractures of the middle third of the femur that are stable to shortening (i.e. transverse or short obliques) are eminently suitable for "K" nailing. Fractures that occur outside of these narrow confines had to be treated by other means until relatively recently.

In 1952 Modny developed the transfixion intramedullary nail. In 1972 Klemm and Schellmann introduced the much revised interlocking nail[2] and Kempf and Grosse of Strasbourg refined the technique in 1978.[3] This device has allowed us to extend the indications for internal fixation of femoral shaft fractures. An interlocking threaded screw is used to gain secure purchase on the proximal and distal femoral metaphysis, rendering the fracture stable to rotation and shortening. Fractures of the upper or lower thirds can now be successfully treated as can fractures with severe comminution. Allied to this development there has been renewed interest in closed nailing.

The Ulster Hospital, Dundonald, Belfast BT16 0RH.
A B Fogarty, FRCSEd, FRCSI, Senior House Officer.
H A Yeates, FRCSEd, FRCSEd (Orth), Consultant Orthopaedic Surgeon.
Correspondence to Mr Fogarty.

In this paper we present our experience of using one particular design of interlocking nail — the AO nail (Arbeits-gemeinschaft für Osteosynthesefragen).

PATIENTS AND METHODS

The first 45 patients treated at the Ulster Hospital using the AO interlocking nail were followed up at least until fracture union. Forty-five patients with 46 fractures were treated between June 1988 and April 1990.

There were 34 men and 11 women with an average age of 38 years. Thirty-one patients were under the age of 40 and 11 patients were over the age of 60. Twenty-three of the injuries were caused in road traffic accidents, twelve in falls, seven at work and one was due to a gunshot wound. One patient sustained bilateral femoral fractures in a road traffic accident; one patient had "prophylactic" nailing for a painful metastatic deposit and one patient had nailing following an elective osteotomy for malunion of an old femoral fracture.

Four fractures were compound; one was grade I and three were grade II.[4] Nine fractures were in the upper third of the femur, 25 in the middle third and 11 in the lower third. Twenty-one fractures were classified as transverse, 11 as oblique and 13 as comminuted. Fracture comminution was graded according to Winquist's classification.[5] For the purposes of this paper only those fractures of grades 3 or 4 have been termed "comminuted".

Fifteen patients sustained another major injury, which were all fractures, with ten patients sustaining another lower limb fracture. There were no cases of serious head injury or visceral injury.

After initial assessment, and resuscitation where appropriate, all patients were placed in traction, usually skeletal traction if there was likely to be any delay before surgery. Most patients were operated upon on the next available list. In 18 cases operation was delayed for one week or longer for a variety of reasons: seven patients developed fat embolism syndrome and in six cases the patient's referral had been delayed. Surgery was delayed for one patient because of a compound wound and in one patient conservative management had failed. In three cases there was no clear reason for delay. Overall the average interval between injury and surgery for all patients was 9·4 days. The average interval between injury and the development of fat embolism syndrome in the seven patients was 2·2 days.

OPERATIVE TECHNIQUE

The patient is placed supine on a fracture table and traction is applied through a skeletal pin, either through the tibial tuberosity or the distal femoral metaphysis. The injured leg is adducted to allow access to the greater trochanter and the uninjured leg is held out of the way to facilitate imaging using the portable C-arm fluoroscope (Fig 1).

The fracture is reduced by closed manipulation and the position checked by the image intensifier. Limb rotation must be assessed clinically at this point. An incision is made over the greater trochanter and a guide wire is passed into the medullary canal of the upper femoral shaft. The wire is then guided across the fracture into the distal femoral shaft. The medullary canal is next reamed

by passing flexible reamers over the guide wire. Finally the definitive nail is passed down the femoral canal (Fig 2). Inadequate reaming can result in increasing comminution during nail placement. The smallest AO nail is 12 mm diameter and this necessitates reaming the medullary canal to at least 13 mm diameter. Reamer failure occurred in one of our cases.

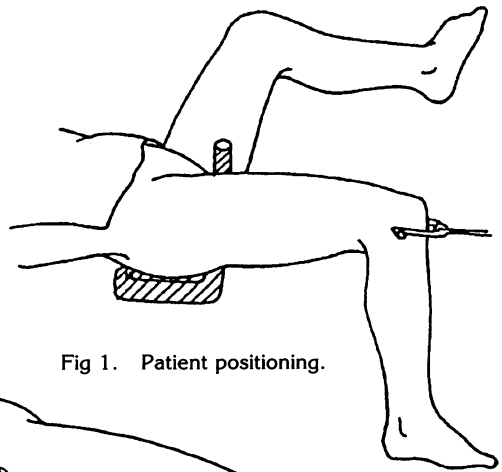

Fig 1. Patient positioning.

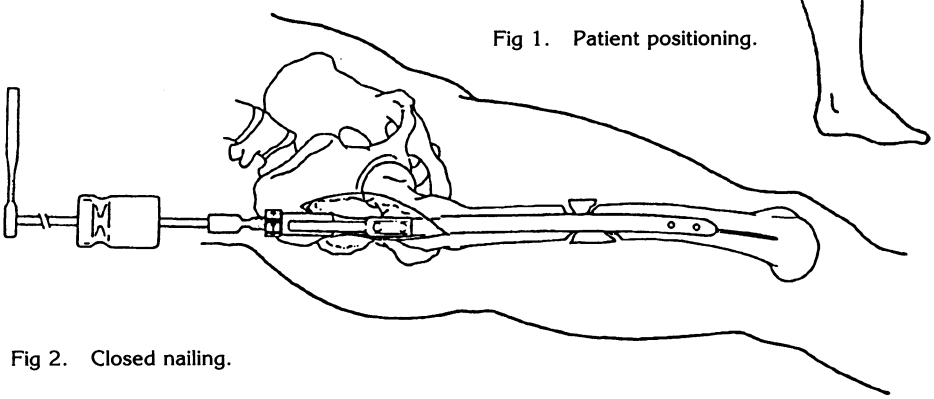

Fig 2. Closed nailing.

Occasionally the fracture site must be exposed to achieve a reduction or to allow passage of the guide wire. This is more likely to occur if surgery is delayed; 14 cases were opened in this series. In four this was unavoidable; two patients required removal of previous internal fixation, one required débridement of a compound wound and one case involved an osteotomy. In the others exposure proved necessary to facilitate a difficult reduction. For the latter group the average delay between injury and surgery was 14 days. The average delay for those cases that were not opened was six days. This difference was highly significant (Mann-Whitney test, $p < 0{\cdot}002$).

At this point locking can be carried out. The choice of whether to lock proximally, distally, fully or not at all is based upon preoperative assessment of the fracture and intraoperative assessment of fixation stability. In general, proximal fractures require proximal locking, distal fractures require distal locking and fractures that are comminuted often need to be fully locked. Using the AO device there are two proximal locking holes; the circular hole is used for static locking and the oval hole allows compression at the fracture site upon weightbearing (dynamization). Proximal locking is carried out using a jig attached to the upper end of the nail and consequently is fairly straightforward. Distal locking however can be very difficult.

In this series 12 cases were fully locked, six cases required proximal locking only and 15 cases distal locking only. All patients were given perioperative antibiotic prophylaxis using cephamandole. Of the cases that did not require another operative procedure the average total anaesthetic time was 105 minutes. Postoperatively patients were mobilized with the aid of crutches, and knee

bending exercises were commenced. Patients were discharged from hospital when their wounds were healed and when they were safe on crutches. All patients were followed up at regular intervals at least until union was observed. Union was felt to be established when there was adequate radiological evidence of callus formation.

RESULTS

Thirty-five patients were mobilized on crutches, partially weightbearing, within three weeks of surgery. Of course these patients were free of all splintage immediately after surgery and most were sitting out of bed within days of operation. The ten patients whose mobilization was delayed included six patients who had other lower limb injuries, three patients over 80 years old who were frail, and one patient who required re-operation for malrotation. For these patients surgery was still beneficial; indeed multiple injuries and old age are important indications for internal fixation. Excepting the three elderly patients who never mobilized for medical reasons, the average time to mobilization was 16 days.

Twenty-six patients were fit for discharge home within three weeks of surgery. The 19 patients whose discharge was delayed included the ten who were slow to mobilize, four with other lower limb injuries, four elderly patients with medical problems and one who had a minor wound infection. Excepting the three patients who never mobilized, the average time to discharge was 22 days.

Knee movement recovered quickly in most patients. Thirty-seven patients recovered 90° or more of flexion within three months of surgery. In the other patients poor knee flexion was caused either by concomitant lower limb trauma or poor general condition. Younger patients with isolated femoral fractures recovered remarkably quickly. Some achieved a range of knee movement of 0 – 110° within ten days of surgery. The average range was 0 – 110° at 3 months. The average time to union was 14 weeks. There was one case of non-union.

Results have been graded according to the system used by Thoresen.[6] Twenty-nine were graded as excellent, eight were good, three were fair and two were poor. Four results were not graded including two elderly patients who died because of poor general condition, one patient who died of malignancy after discharge, and one patient who also had a compound tibial fracture. The two poor results include one case of non-union and one case of early implant failure. The three fair results include one elderly patient who never mobilized and two patients who each had 2 cm of femoral shortening.

Eleven nails have been removed after fracture union. In five cases this was carried out for hip pain and in the remainder after patient request. On average the nails were removed eleven months after their insertion.

COMPLICATIONS

Thirty-five patients had an uncomplicated early recovery. Five patients had postoperative medical complications and five had surgical problems. Two developed minor superficial wound infections which responded to antibiotic therapy. One had a wound haematoma which required splintage, one required traction postoperatively despite full interlocking such was the marked degree of

fracture comminution, and one developed malrotation soon after surgery and re-operation was required to insert locking screws.

Late complications were seen in twelve patients. Six had significant hip pain as a result of irritation from the upper end of the nail. In all of these the nail had not been proximally locked and symptoms were probably caused by nail migration. One patient required re-impaction of the nail and the others had their nails removed after fracture union with full resolution of their symptoms.

Two patients had significant knee stiffness; both had sustained an associated knee injury. There were two cases of significant (>2 cm) shortening. In one, shortening occurred despite fully locking. The other fracture had not been fully locked, when in retrospect it probably should have been. There was one case of non-union and one case of early implant failure. There were no cases of deep infection.

DISCUSSION

It is now well recognized that intramedullary nailing provides very stable fixation for long bone shaft fractures. The bone is splinted throughout its length and as a result postoperative displacement or angulation is prevented (Fig 3). Axial rotation and telescoping forces can however occur using unlocked nails inappropriately. The conventional nail depends for its stability on endosteal contact and interdigitation of fracture fragments. Most grip is therefore afforded where the medullary canal narrows to its isthmus at the middle third of the shaft. Fractures towards the ends of the shaft, or comminuted fractures, will not be held by a conventional nail (Fig 4). The addition of interlocking screws, however, effectively controls these otherwise difficult fractures. The screws are threaded through both intact cortical bone and the nail itself, thereby controlling both malrotation and shortening.

Nevertheless some surgeons have been reluctant to adopt this particular operative procedure because of the many technical difficulties associated with it.[7]

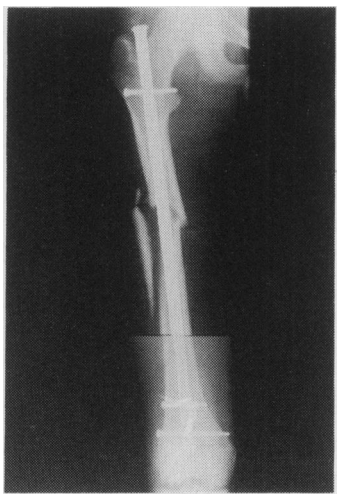

Fig 3. Comminuted shaft fracture after nailing.

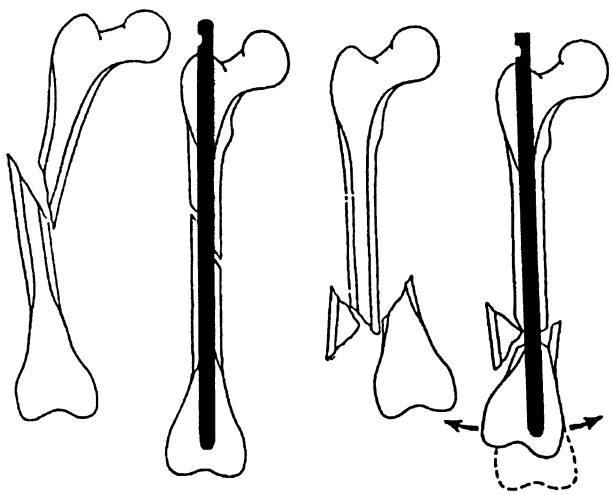

Fig 4. Fracture patterns.

The surgery is protracted and demanding. Our anaesthetic times confirm this, and similar times have been reported for early experience in other units. The closed reduction and passage of the guide wire can be very difficult and depend on proficient use of the fluoroscope as much as accurate surgery. Distal interlocking can be particularly tedious and with it the risk of exposure to X-rays increases. Most surgeons have now adopted the "freehand" technique for distal targeting, but this still depends on perfect alignment of the fluoroscope prior to targeting. Several workers have reported X-ray exposure times in excess of 10 minutes per operation,[8] but if modern equipment is used, this should be reduced to well under 20 seconds.[9]

Grosse and Kempf originally recommended dynamization of their nails after 12 weeks by removing the locking screws. This should enhance fracture compression and promote union, but other workers have since refuted this statement.[10] Our case of non-union initially had this fracture plated in another hospital: after early implant failure this was revised to a fully locked nail. He was lost to follow up for 15 months, and then presented with nail fracture at the site of established non-union. In this case the rigidity of the system might have contributed to non-union, and with hindsight dynamic locking would have been more appropriate. Union rates are remarkably good in most reported series. It must be remembered however that the patient can be rehabilitated long before union occurs. Some patients develop a false sense of security and return to work (unadvised) within two months of injury.

The results of interlocking nails compare favourably with either plating or conservative treatment of femoral fractures. Conservative management by traction followed by cast-bracing is still regarded by many surgeons to be a sure and safe method of treatment. However, hospitalization and recovery are prolonged and there tends to be a high rate of malunion. Hardy has advocated early cast-bracing resulting in fairly quick discharge from hospital. However, over 10% of his reported patients had femoral shortening of over 2 cm and 40% over 1 cm.[11] In an earlier study Rokkanen showed the benefits of nailing over conservative management resulting in a 23% higher rate of full mobility one year after surgery; these differences were more marked in older patients.[12]

During the 1960's it became popular to treat femoral shaft fractures by plating. The advantages of management without traction were obvious but local complications were common. In one study, Rüedi reported a 6% incidence of bone infection after plating closed comminuted fractures.[13] There was a 7% implant failure rate and a 7% rate of delayed union: the overall functional results were good but many surgeons today would regard the rate of local complications as prohibitive. More recently Böstman of Helsinki, in a controlled series, has shown a significantly increased incidence of local complications following plating of femoral shaft fractures when compared with nailing.[14] It is now known that plating disrupts the periosteal blood supply of the fracture fragments and can result in disturbances of fracture healing. Conversely intramedullary reaming and nailing disrupt the endosteal vasculature, but this does not appear to affect significantly the cortical blood supply.[15]

The advantages of closed nailing over open operation continue to be debated. In theory if one disturbs the fracture haematoma by exposing the fracture site,

healing will be delayed and the risk of infection will be increased. Rokkanen reports slightly better results for closed nailing over open nailing[12] but in a more recent and better controlled study, Leighton did not find any significant difference.[16] There have been several papers advocating the use of locked nails for compound fractures. Chapman in 1986 suggested delayed closed nailing (after wound healing).[17] More recently, however, Brumback reported on 46 grade III open fractures. He concluded that infection was not increased when early nailing was compared with delayed operation.[18]

Infection remains one of the most serious complications. Most series have reported a small rate of deep infection and we were fortunate not to see any cases. There was one case of early implant failure illustrating one of the weaknesses of this particular implant design. The nail fractured through one of the proximal locking holes which was at the level of the subtrochanteric fracture (Fig 5). It is felt that the transverse lie of the proximal locking holes might result in an area of weakness.[19] Revision was carried out using a Grosse-Kempf nail.

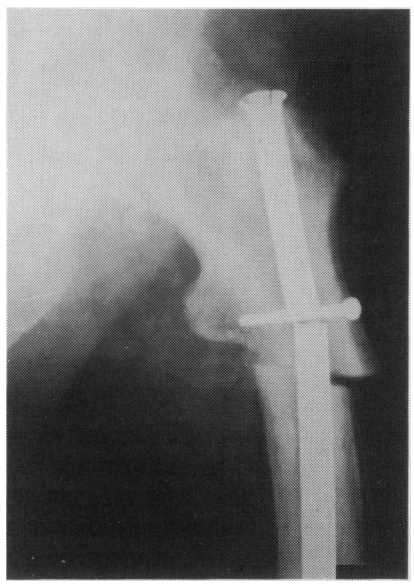

Fig 5.
Implant failure four weeks postoperatively.

From our series it is evident that there is room for improvement in several areas. In particular the delay between injury and surgery was much longer that that reported by others. A number of factors combine to explain this. One surgeon carried out most of the operations, which resulted in unavoidable delay for some patients. Also, in many patients surgery had to be delayed because of respiratory complications necessitating treatment in the intensive care unit. Our rate of respiratory complications was much higher than in comparable series. It is now felt that early surgery reduces the incidence of fat embolism syndrome.[20] In addition to reducing early morbidity, early surgery has been associated with quicker overall recovery. Eriksson demonstrated a much faster return to pre-injury function following early nailing when compared with delayed nailing.[21]

In summary, interlocking nails have allowed us to extend the hitherto limited indications for internal fixation of femoral shaft fractures. The operation gives a good technical result, allied to early mobilization and discharge for the patient. Union rates are high with a low rate of complications. Hitherto the technique has appealed largely to enthusiasts. Nevertheless it should now be made available to all patients with fractured femoral shafts, especially elderly patients. The service would be improved by earlier referral, and earlier surgery.

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Geographical variations and recent trends in cancer mortality in Northern Ireland (1979–88)

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SUMMARY

Cancer mortality in the 35–74 year age-range for selected sites during the period 1979–88 was investigated for the 26 district council areas of Northern Ireland. Trends in rates during the period were also studied and compared with trends in an earlier period, and with trends reported from the rest of the United Kingdom.

Statistically significant differences between the age-standardised death rates in the 26 areas were observed for stomach cancer (women only), pancreatic cancer (women only), lung cancer (men and women) and for all cancers (men and women). Some evidence of spatial aggregation of rates was apparent for ovarian cancer even though rates in the 26 areas did not differ significantly. The patterns are illustrated with maps and some difficulties of interpretation are discussed.

Mortality rates for oesophageal cancer increased during the period in both sexes while rates for stomach cancer decreased. Colon cancer rates increased significantly only in men, while an increase in lung cancer rates was confined to women. The mortality from all cancers increased significantly during the period by 0·8% per annum in men and 0·9% per annum in women. These trends were found to be broadly comparable with those reported elsewhere in the United Kingdom.

INTRODUCTION

Approximately one fifth of all deaths in the Northern Ireland population are attributed to cancer.[1] Although for both men and women overall age-standardised mortality rates for cancer are slightly lower in Northern Ireland than in England and Wales, rates for colon cancer and melanoma are higher.[2] Death rates throughout Britain are not uniform and recent statistics[3] and cancer atlases[4, 5] have highlighted prominent geographic gradients and patterns.

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This paper describes the pattern of cancer mortality among the 26 district council areas within the province and compares the recent trends in death rates in Northern Ireland with trends in an earlier period[6] and with trends reported from England and Wales[7] and Scotland.[5]

MATERIAL

Mortality data were supplied on magnetic tape by the Registrar General's Office for the period 1979 – 88. This represents the 10 year period following the introduction of the 9th revision of the International Classification of Diseases. Although the 9th revision introduced only minor changes in the rules for the coding of cancer, restriction of the study to this period avoids any difficulty with cross-revision discontinuities.

The smallest geographical unit available for deaths throughout this period was the district council area. However, deaths registered since 1984 have also had the postcode of residence coded, and this will facilitate more detailed studies of geographical mortality variations in the future. Although the Registrar General's Annual Report[1] does give tables of deaths by cause for each district council area, these tables do not provide age-standardised comparisons.

Because of uncertainty about the registered cause of death in the elderly, only deaths of individuals aged between 35 and 74 years have been included in the analysis presented in this paper.

Population figures by district council area were obtained from the 1985 revision of the 1981 census. The analysis of trends over the 10 year study period made use of the Registrar General's mid-year population estimates. The validity of these estimates is supported by preliminary results from the 1991 census which suggest that the 1990 mid-year figure overestimated the resident population at census night by only 1·2%.

METHODS

Even with 10 years' data the numbers of cancer deaths for some sites were small, and the analysis reported in this paper has therefore been restricted to the major sites.

Rates in the 26 district council areas were age-standardised by the indirect method[8] using Northern Ireland rates for the entire period as the standard. This produced standardised mortality ratios (SMR's) for each site in each district council area which took account of differences in age structure between the areas. An SMR of 100 indicates that an area has mortality equal to that of Northern Ireland as a whole. Correspondingly, SMR's less than 100 and greater than 100 indicate respectively mortality lower than and higher than that of Northern Ireland as a whole. Trends in mortality were investigated by calculating directly standardised rates[8] using the Northern Ireland 1981 census population as the standard.

A test for heterogeneity (i.e. dissimilarity or lack of uniformity) in the standardised rates among the 26 district council areas were obtained using Poisson regression models.[8] None of the causes of death considered showed evidence of extra-Poisson variation which would have invalidated the test for heterogeneity. A test of spatial aggregation described in a previous cancer atlas[5] was employed to test for similarity of the rates in adjacent district council areas. The test was applied to

the ranks of the SMR's in the 26 areas. Fifty five pairs of district council areas which were contiguous were identified, and a test statistic, D, was obtained as the mean of the corresponding 55 absolute differences in ranks. The value of D necessary for statistical significance was determined from the distribution of D obtained in 100,000 random rankings of the 26 areas.

Trends in directly standardised rates were displayed graphically as three-year moving averages to reduce random variation. Poisson regression models were used to estimate and test for linear trends over the 10 year period. None of the causes of death considered showed evidence significant of non-linear trends or of trends which differed significantly between the age-groups under study.

RESULTS

All Cancers (ICD 140 – 208)

There was highly significant heterogeneity in the mortality rates for all cancers between the 26 areas in both men ($X^2 = 252{\cdot}4$, df = 25; $p < 0{\cdot}001$) and women ($X^2 = 74{\cdot}8$, df = 25; $p < 0{\cdot}001$). Table I shows SMR's by area for each sex. Among both men and women the SMR was significantly elevated in Belfast and Londonderry. The SMR's for men in Castlereagh and for women in Newry & Mourne were also significantly elevated. Variations in mortality appeared to be greater among men. For both sexes there was a cluster of high mortality in the Belfast, Castlereagh, Newtownabbey and Carrickfergus areas, although the test for spatial pattern was only significant among men ($D = 6{\cdot}67$, $p < 0{\cdot}01$).

Trends in mortality for the major sites are depicted in Fig 1. There was a significant increase in mortality from all cancers during the period, estimated as 0·8% (95% confidence limits 0·1% and 1·4%) per annum in men and 0·9% (0·2% and 1·6%) per annum in women. Such a trend has been apparent in male rates since the 1950's, but represents a more recent phenomenon in female rates.[6]

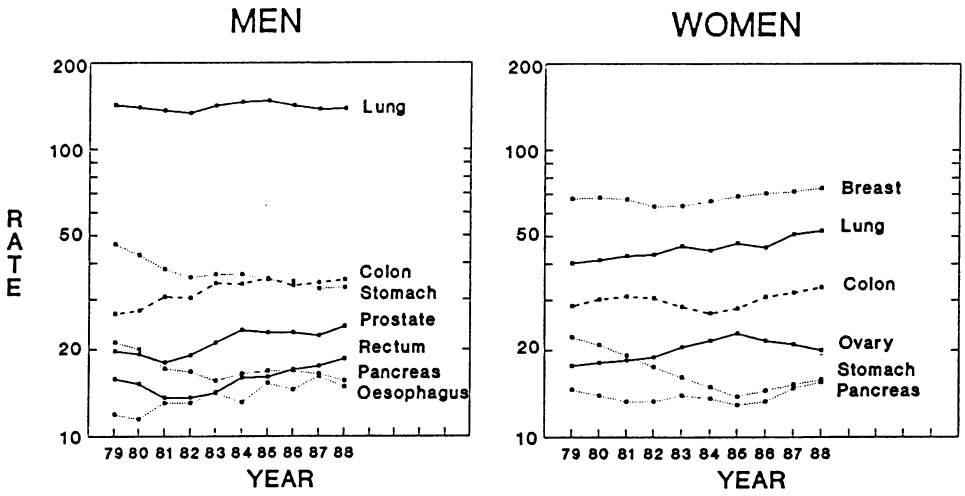

Fig 1. Trends in directly standardised mortality rates per 100,000 (age 35 – 74 years) for the major cancer sites in Northern Ireland, smoothed using a three-year moving average.

TABLE I

Standardised mortality ratio (SMR) by District Council Area for all cancers (ICD 140 – 208) in 1979 – 88 for the 35 – 74 year age-group

DISTRICT COUNCIL AREA	MALES			FEMALES		
	Observed deaths O	Expected deaths E	SMR 100* (O/E)	Observed deaths O	Expected deaths E	SMR 100* (O/E)
Ards	417	422·5	99	346	365·3	95
Belfast	2,988	2,485·8	120*	2,521	2,357·9	107*
Castlereagh	525	478·4	110*	434	423·9	102
Down	345	362·6	95	304	305·9	99
Lisburn	530	532·8	99	463	474·2	98
North Down	431	484·4	89*	429	466·4	92
Antrim	222	245·2	91	190	207·2	92
Ballymena	336	385·1	87*	308	332·4	93
Ballymoney	142	164·3	86	129	130·0	99
Carrickfergus	186	184·2	101	176	174·0	101
Coleraine	280	320·1	87*	302	288·6	105
Cookstown	147	190·3	77*	124	146·5	85*
Larne	212	218·1	97	180	191·8	94
Magherafelt	181	230·3	79*	163	171·7	95
Moyle	97	115·0	84	70	87·1	80*
Newtownabbey	488	457·9	107	440	414·0	106
Armagh	300	338·6	89*	236	278·6	85*
Banbridge	197	235·3	84*	174	189·6	92
Craigavon	448	457·0	98	351	416·4	84*
Dungannon	296	317·9	93	247	242·0	102
Newry & Mourne	531	501·4	106	465	409·9	113*
Fermanagh	352	434·6	81*	273	302·2	90
Limavady	134	154·8	87	109	116·5	94
Londonderry	578	489·2	118*	519	443·2	117*
Omagh	252	322·4	78*	235	229·4	102
Strabane	160	246·8	65*	166	189·1	88
N. Ireland	10,775	10,775·0	100	9,354	9,354·0	100

*significantly different from 100 ($p < 0·05$).

TABLE II

Standardised mortality ratios (SMR's) by District Council Area for the main cancer sites in 1979 – 88 for the 35 – 74 year age-group

	SITE : ICD 9th revision code																
DISTRICT COUNCIL AREA	Oesophagus (150)		Stomach (151)		Colon (153)		Rectum (154)		Pancreas (157)		Lung (162)		Breast (174)	Ovary (183)	Prostate (185)	Bladder (188)	
	M	F	M	F	M	F	M	F	M	F	M	F	F	F	M	M	F
Ards	140	*110*	85	98	110	111	117	111	90	112	85	73	96	112	113	110	*86*
Belfast	118	98	116*	123*	101	91	108	112	88	99	142*	146*	99	100	94	109	119
Castlereagh	109	*147*	82	96	95	110	95	115	95	63*	127*	120	104	100	125	122	*58*
Down	132	*147*	79	70	118	79	96	*66*	68	92	94	98	104	79	96	96	102
Lisburn	78	*108*	105	89	94	134*	84	87	131	60*	100	77*	109	101	100	75	*136*
North Down	128	*63*	87	112	113	90	51*	29*	97	64*	81	95	97	122	97	146	*98*
Antrim	*68*	*250*	99	80	114	90	*92*	*50*	128	*32**	87	75	104	108	79	*74*	*79*
Ballymena	44*	*91*	66	87	101	95	155	113	105	151	83*	69*	103	108	92	65	*24**
Ballymoney	*51*	*80*	77	*57*	89	119	*76*	*134*	*123*	*103*	71*	56*	79	170	*68*	*131*	*63*
Carrickfergus	*120*	*88*	92	*94*	93	94	*68*	*118*	*135*	*25**	97	81	105	120	139	*197*	*184*
Coleraine	70	*87*	95	74	91	95	108	*129*	49*	157	83	87	109	131	97	*100*	*191*
Cookstown	*103*	*35*	105	*75*	64	84	*117*	*164*	*94*	*105*	70*	72	81	*82*	*48**	*94*	*164*
Larne	*64*	*26**	82	111	73	111	*125*	*123*	*144*	*113*	109	76	95	118	146	*82*	*82*
Magherafelt	*99*	*177*	101	*63*	64	119	*75*	*119*	87	*114*	54*	62*	74	114	109	*122*	*47*
Moyle	*50*	*114*	91	*60*	*106*	*104*	*213*	*38*	*135*	*122*	58*	84	88	*140*	*91*	*31**	*88*
Newtownabbey	96	*139*	92	104	120	116	88	59	99	87	114	97	112	96	110	104	*140*
Armagh	67	*109*	81	78	61	95	81	*98*	119	110	85	41*	76*	70	114	*94*	*57*
Banbridge	*36**	*27**	89	122	104	69	*73*	*107*	85	*102*	77	59*	125	104	*53**	*60*	*41*
Craigavon	140	*61*	101	22	152*	71	65	49*	84	126	78*	82	101	105	120	134	*0*
Dungannon	62	*84*	83	74	130	105	77	*141*	154	90	79*	83	107	105	118	*88*	*66*
Newry & Mourne	90	*111*	134*	140	102	107	158*	116	102	90	91	99	101	103	87	99	77
Fermanagh	124	*50*	123	83	84	90	96	*112*	46*	100	63*	76	86	60*	93	40*	*52*
Limavady	*127*	*179*	82	*95*	71	98	*64*	*30**	*115*	*77*	75*	75	103	*51*	120	*115*	*140*
Londonderry	114	*92*	129	114	112	138*	122	131	151	178*	119*	127*	103	92	92	132	*198*
Omagh	97	*153*	88	108	83	137	99	*118*	96	47*	61*	58*	121	92	114	*54*	*102*
Strabane	*35**	*0*	77	141	54	75	60	*89*	117	*183*	55*	71	82	*40**	108	*29**	*42*

*significantly different from 100 ($p < 0{\cdot}05$).

Figures in *italics* are based on fewer than 10 expected deaths.

Oesophagus (ICD 150)

In neither sex was there evidence of significant heterogeneity or spatial aggregation in oesophageal cancer between the district council areas. Table II shows that no individual SMR significantly exceeded 100, and most of the SMR's which were significantly less than 100 were based on small numbers of deaths.

An increasing trend in mortality from oesophageal cancer was evident in both sexes, although the result only attained significance in men ($X^2 = 4 \cdot 46$, $df = 1$; $p < 0 \cdot 05$). The increase was estimated as 4% per annum in both men and women. This represents a reversal of a generally decreasing trend in rates reported for all age-groups during the 30-year period ending in 1975.[6] Recent increases in mortality have also occurred in England and Wales[7] and incidence rates have been reported to have increased dramatically in Scotland since 1970.[5] In view of the very poor prognosis associated with this site, it is likely that mortality data provide a good measure of the incidence rate.

Stomach (ICD 151)

In men, district council variations in stomach cancer mortality did not attain significance, although SMR's significantly greater than 100 were observed in Belfast (116) and Newry & Mourne (134). However, significant heterogeneity in rates was observed in women ($X^2 = 45 \cdot 4$, $df = 25$; $p < 0 \cdot 05$). Although the SMR for Belfast (123) was the only one significantly to exceed 100, Newry & Mourne (140) had the highest rate. The corresponding map in Fig 2 suggests clusters of high incidence among women in the west, east and south-east of the Province, but the same pattern was not evident among men. The test of spatial aggregation failed to attain significance in either sex.

In both men ($X^2 = 13 \cdot 6$, $df = 1$; $p < 0 \cdot 001$) and women ($X^2 = 10 \cdot 5$; $df = 1$; $p < 0 \cdot 01$) there was a significant decrease in stomach cancer mortality throughout the period. The reduction was estimated as 4% per annum in men and 5% per annum in women. This decreasing trend is a continuation of a long-established pattern in stomach cancer mortality in Northern Ireland,[6] and a similar decline has taken place in England and Wales[7] and in Scotland.[5]

Colon (ICD 153)

In neither men nor women was there evidence of significant heterogeneity in colon cancer mortality between areas. Individual SMR's which significantly exceeded 100 occurred among men in Craigavon (152) and among women in Lisburn (134) and Londonderry (138). The tests for spatial aggregation did not attain significance.

An increasing trend in colon cancer mortality was significant only among men ($X^2 = 7 \cdot 29$, $df = 1$; $p < 0 \cdot 01$). The increase was estimated as 3% per annum. Historical data show a reduction in mortality among both men and women in Northern Ireland in the 1950's followed by a steady increase in the 1960's and 1970's.[6] In England and Wales the male rate has remained static in recent years while the female rate has continued to decline.[7]

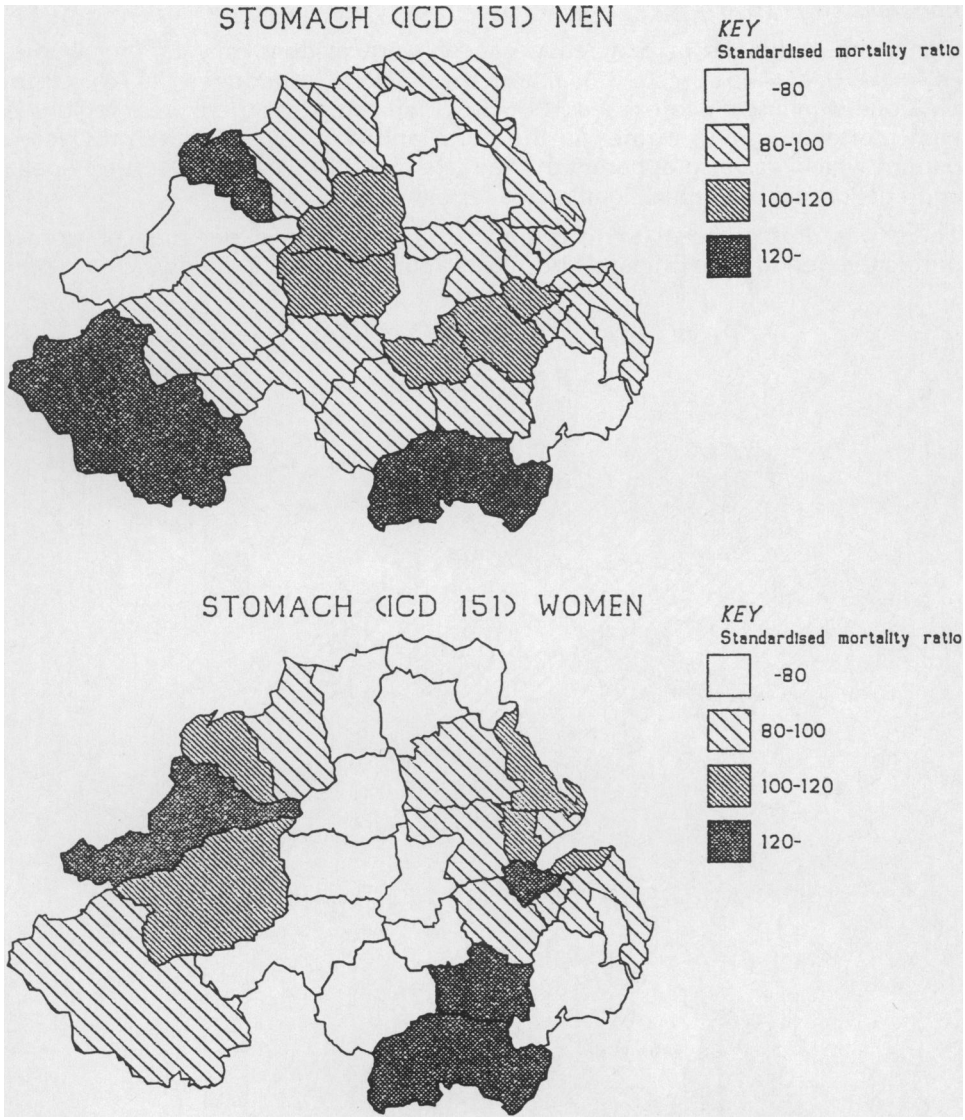

Fig 2. Map of standardised mortality ratios (age 35 – 74 years) for cancer of the stomach during the period 1979 – 88 in 26 district council areas.

Rectum (ICD 154)

There was no evidence of variation or aggregation in rates for rectal cancer mortality in the 26 areas. The SMR for men in Newry & Mourne (158) was the only one significantly to exceed 100.

Trends in rectal cancer were not significant for either sex. This is in keeping with data for the pre – 1975 period which showed little change in the rates in either sex since the 1960's.[6] In contrast, rates in England and Wales have declined steadily in the post-war years.[7]

Pancreas (ICD 157)

Significant variations in pancreatic cancer were evident only among women ($X^2 = 51 \cdot 0$, df = 25; $p < 0 \cdot 01$), although the SMR in Londonderry (178) was the only one significantly to exceed 100. Fig 3 indicates that there were regions of high mortality among women in the north and north-west of the province, a pattern which was also apparent in the male rates. However, the test for spatial aggregation did not attain significance for either sex.

There was no significant trend in pancreatic cancer in either men or women during the period. The England and Wales figures showed a steady increase prior

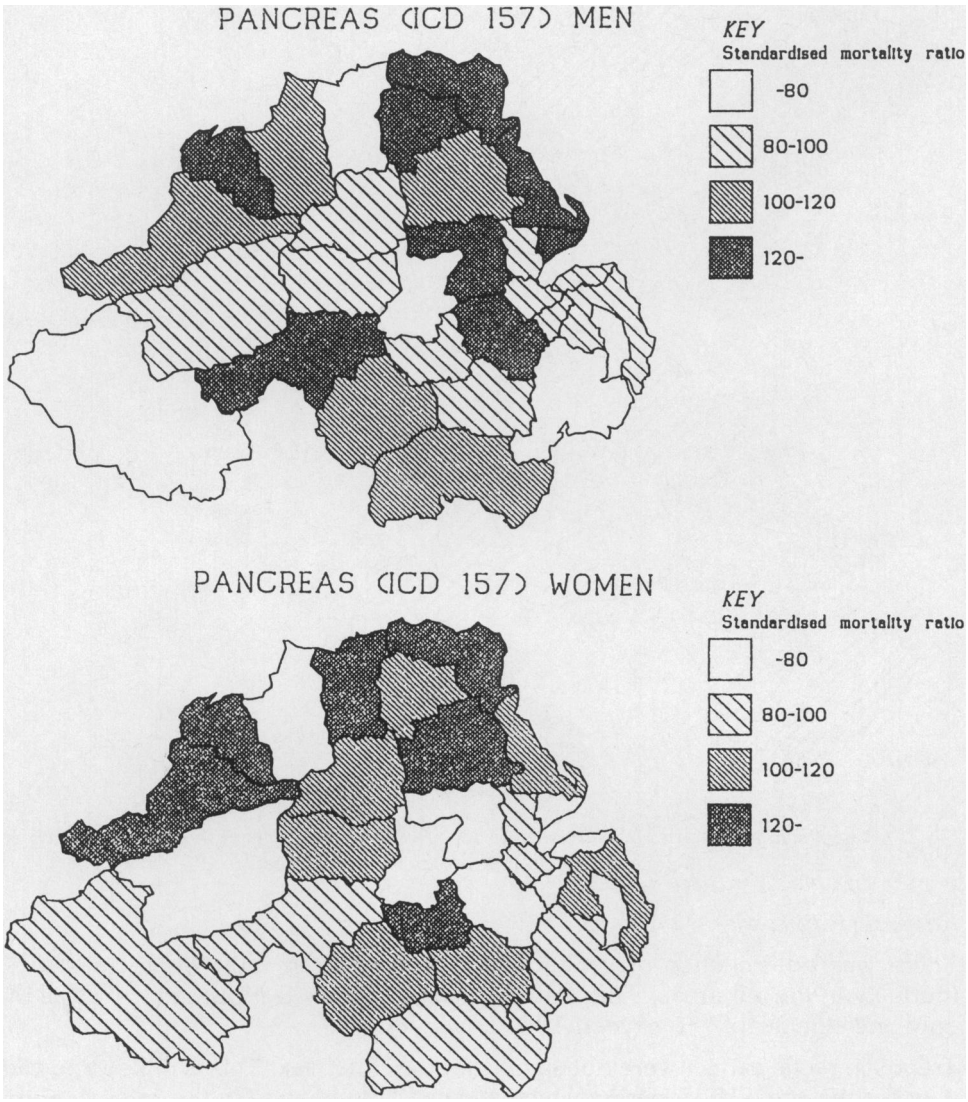

Fig 3. Map of standardised mortality ratios (age 35 – 74 years) for cancer of the pancreas during the period 1979 – 88 in 26 district council areas.

to 1970, but rates have stabilised in more recent years.[7] Incidence rates in Scotland were still increasing in the 1970's.[5] The poor prognosis of pancreatic cancer would suggest that the incidence rate in Northern Ireland should mirror the mortality rate.

Trachea, bronchus, lung (ICD 162)

Lung cancer rates showed highly significant area to area variation both among men ($X^2 = 316 \cdot 7$, $df = 25$; $p < 0 \cdot 001$) and women ($X^2 = 147 \cdot 0$, $df = 25$; $p < 0 \cdot 001$). Significantly elevated SMR's were observed among men in Belfast (142), Castlereagh (127) and Londonderry (119). Among women, SMR's were also significantly raised in Belfast (146) and Londonderry (127). Fig 4 illustrates that the majority of other areas had SMR's less than 100, and that the south-west of the Province had particularly low mortality from lung cancer. The test for spatial aggregation was significant in men ($D = 6 \cdot 75$, $p < 0 \cdot 01$) but not in women.

A significant trend in lung cancer mortality was evident only in women ($X^2 = 10 \cdot 1$, $df = 1$; $p < 0 \cdot 01$). An estimate of the increase in rate was 3% per annum. In contrast, mortality among men remained relatively static throughout the 10 year period. Historical data for Northern Ireland indicate that male rates increased almost tenfold while female rates trebled in the 45 year period ending in 1975.[6] Male rates have recently begun to decline in England and Wales, but female rates continue to increase.[7]

Breast (ICD 174)

There was no evidence of significant area to area variation or spatial aggregation in breast cancer mortality rates, and none of the 26 areas had an SMR which significantly exceeded 100.

The slightly increasing trend in breast cancer mortality during the period did not attain significance. There has been an increase in rate in Northern Ireland in the 25 years to 1975,[6] a trend which continues to be apparent in the England and Wales rates.[7]

Ovary and other uterine adnexa (ICD 183)

Variations in ovarian cancer between areas did not attain significance, with no SMR for any area significantly exceeding 100. However, the test of spatial aggregation was highly significant ($D = 6 \cdot 82$, $p < 0 \cdot 01$). The map in Fig 5 shows an area of high incidence in the north of the province with areas of low incidence in the west and around Belfast.

A net upward trend in mortality from ovarian cancer during the period did not attain significance. England and Wales data showed an increase in post-war years, but rates have stabilised recently.[6] Incidence in Scotland has been increasing for many years.[5]

Prostate (ICD 185)

There was no evidence of significant heterogeneity or spatial aggregation in prostatic cancer, with no SMR showing statistically significant elevation.

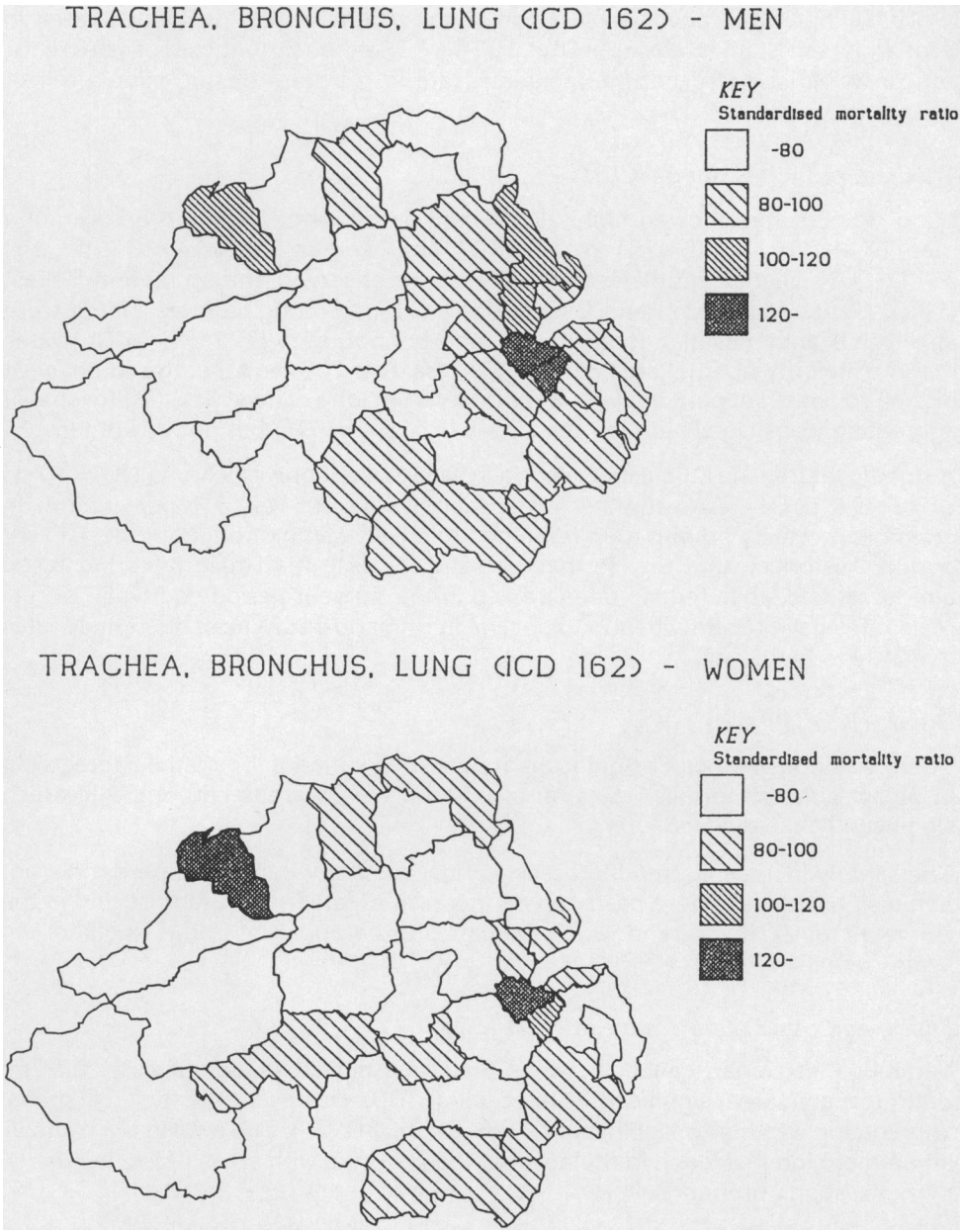

Fig 3. Map of standardised mortality ratios (age 35 – 74 years) for cancer of the lung during the period 1979 – 88 in 26 district council areas.

The upward trend in prostatic cancer mortality apparent during the period did not attain significance. A gradual increase in rate has occurred in Northern Ireland in the 30 years to 1975.[6] England and Wales mortality rates continue to show an increasing trend[7] as do Scottish incidence rates.[5]

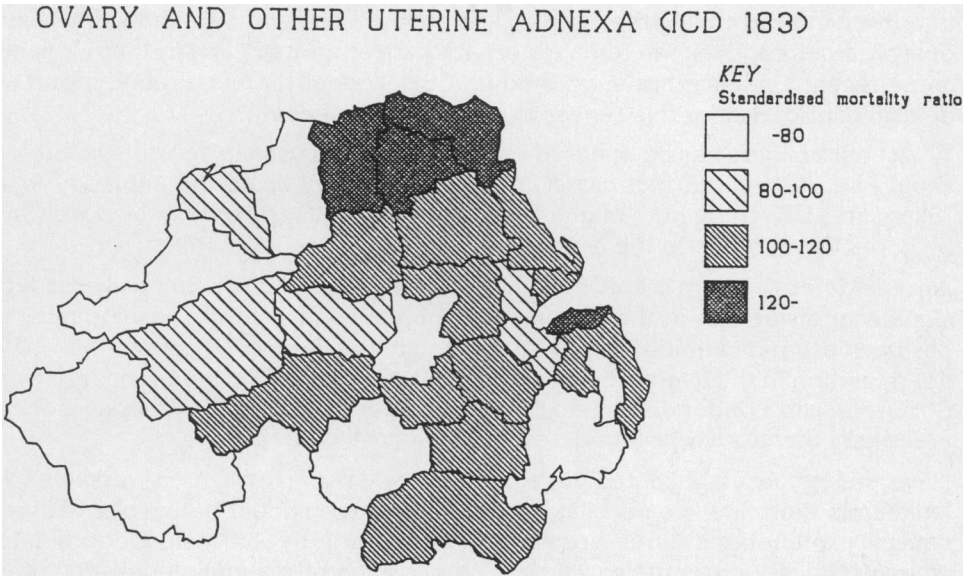

Fig 5. Map of standardised mortality ratios (age 35 – 74 years) for cancer of the ovary during the period 1979 – 88 in 26 district council areas.

Bladder (ICD 188)

In neither men nor women was there evidence of heterogeneity or spatial aggregation in bladder cancer mortality in the areas. No area had an SMR significantly exceeding 100.

There was no significant trend in bladder cancer mortality in either men or women. Incidence rates have been rising in Scotland in both sexes.[5]

DISCUSSION

Regional mortality analysis is potentially useful in health planning and indeed, since the clarification of responsibilities outlined in the recent NHS White Paper, has been central to needs assessment undertaken by public health medicine departments. Such analyses have limited explanatory power but may sometimes generate new hypotheses that demand further investigation. Although some of the patterns described in this report, such as the high lung cancer mortality in Belfast and Londonderry, can be partly explained by the distribution of known risk factors (eg smoking and air pollution), it is important to clarify some methodological issues before any apparent geographic pattern is assumed to have an environmental origin.

Firstly, whilst age-standardisation permits comparisons between regions that take into account differences in population age-structure, many standardised indices are heavily weighted by deaths among the elderly.[9] High SMR's can be indicative of more disease or earlier deaths (or both), and the distinction markedly affects the choice of hypothesis that may be advanced to explain regional variations.[10]

Related to this is the fact that many chronic diseases such as cancer have long induction periods, and exposures early in life (possibly even in childhood) may be

important in determining the disease distribution. For instance, although we have observed heterogeneity in female stomach cancer mortality in Northern Ireland, some recent evidence has suggested that the area of birth is a more important determinant of risk for this cancer than is the area of death.[11]

Whilst our analysis has been based on the deceased's usual place of residence, it should be pointed out that cross-area migration may dilute the impact of local "exposures". Even for non-migrants the area of "usual residence" may not always be correctly reported on the death certificate.[12]

An associated problem is that, in small areas, migration could potentially produce significant distortions in the denominator populations used to calculate rates. It has been estimated that only four district councils experienced greater than 10% net migration in the five years following the 1981 census.[13] Two of these, Newry & Mourne and Londonderry, had net inward migration. High death rates in these areas may therefore reflect underestimation of the denominator.

Nevertheless, as highlighted in a recent review of small area variations of leukaemia mortality,[14] a peculiar geographic pattern should not invoke extrinsic causal explanations until possible confounding by intrinsic denominator characteristics such as the social class composition or material deprivation of an area have been taken into account. Unfortunately, any supplementary statistical investigation which employs geographical area as the unit of analysis may fall foul of the "ecological fallacy", whereby associations observed in aggregate data may not reflect the true associations which exist at the level of the individual.[15] Attempts to adjust for the influence of confounding factors using aggregated data from administrative areas (such as district councils) must therefore be interpreted cautiously.

If observed geographical patterns or secular trends cannot be attributed to distortion by small numbers, difficulty in determining the population at risk, bias from migration, or variation in the accuracy of cause of death, then a search for an explanation is required. One must then consider whether the observed patterns or trends are a pointer to aetiological factors or a reflection of variations in survival. Methods exist that can help distinguish between these alternatives, but they rely on the availability of comprehensive disease surveillance data, such as can be provided by a cancer registry.[16]

Whilst the present results taken in isolation could not be the basis of any directed public health action, the patterns uncovered do merit further study. Unfortunately, in addition to its lack of completeness,[17] the local cancer registry neither publishes data by place of residence nor routinely reports survival from the time of diagnosis. Only when such information is available for a five or ten year period will it be possible to discern whether district council areas with high SMR's have greater incidence of disease or have poorer survival.

The authors gratefully acknowledge the assistance of the staff of the Registrar General's Office.

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The National Breast Screening Programme: the first 5,000 women screened in Northern Ireland

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Accepted 17 June 1991.

SUMMARY

The National Breast Screening Programme is an ongoing public health programme. Women between 50 and 64 years are being invited to attend for screening at three yearly intervals. The results of the first 5,000 women screened in the Eastern Health and Social Services Board's unit are presented. The breast cancer detection rate was 7·8 per thousand women screened. The malignant to benign biopsy rate was greater than 1:1.

INTRODUCTION

The working party chaired by Professor Sir Patrick Forrest was appointed in 1985 to report to the Ministers of Health of England and Wales, Scotland and Northern Ireland on the feasibility of breast screening. This party published its report in 1986 and recommended the implementation of a National Breast Screening Programme.[1] It suggested that all women between the ages of 50 and 64 years should be invited for a single oblique mammogram at three yearly intervals. The government accepted this recommendation and agreed to fund the programme. It was anticipated that this should be fully operational by April 1991. In Northern Ireland the implementation of the National Breast Screening Programme has been devolved to Board level. The Eastern Board programme consists of a static screening unit in the Board Headquarters in Belfast and a mobile screening unit will be used to provide screening for women in Lisburn, Newtownards, Downpatrick, Newcastle, Bangor and Portaferry. All assessment clinics take place in the static unit.

SUBJECTS AND METHODS

All women between the ages of 50 and 64 years were identified from the Northern Ireland Central Services Agency general practice lists and invited to attend for screening. A prior notification list was compiled with the names and addresses

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of the eligible women in each practice and this was forwarded to the general practitioner to ensure that the addresses were correct and that there was no contraindication to inviting the women for screening. Each woman then received a letter inviting her to attend for screening at an appointed time. The initial invitation letter stated that a second attendance may sometimes be required. It was hoped that, by stating in the initial letter that screening may require two visits, some of the anxiety generated by recall for assessment might be alleviated. Two views were routinely performed, a medio-lateral oblique and a super-inferior view. All examinations were performed on either a Siemens Mammomat 2S or a Mammomat 2U. All films were reported independently by two radiologists. Women with suspicious lesions were recalled for assessment. Most women recalled were reassured following further evaluation by means of clinical examination, further radiography and/or ultrasound evaluation. Those women requiring surgical biopsy had hospital admission arranged prior to leaving the assessment clinic. Women who did not accept the original invitation to attend for screening received a second invitation. Women who failed to attend following a second invitation will be re-invited during the next round of screening in three years' time.

RESULTS

The Table outlines the results of the first 5,000 women screened. The initial response rate following invitation was 66% which is slightly less than the 70% acceptance rate predicted by the Forrest Report; the recall rate of 5·2% is almost half that predicted. All the women screened in this report were seen in the static screening unit. The radiographers checked all films before the women left the department, so there were no recalls for technical reasons. All women attending for assessment had clinical examination, some had further radiography and some had ultrasound examination of the breasts.

TABLE

Outcome of mammographic screening

Women invited	7,250
Women attended	5,000
Recalled for assessment	260
Requiring further radiography	184
Ultrasound examination	164
Fine needle aspiration	42
Surgical biopsy	75

Forty-two women had fine needle aspiration performed for cytological examination. Sixteen of these aspirations were reported as consistent with malignant disease, ten were diagnostic of benign change and the remaining sixteen did not yield sufficient material for cytological diagnosis.

Of the seventy-five women who were referred for surgical biopsy, thirty-nine had malignant disease, and thirty-six had benign breast change. This is a considerably more acceptable ratio than the 3:1 benign to malignant ratio predicted by the

Forrest Report. The cancer detection rate of 7·8 per 1,000 exceeds the 5 per 1,000 required by the Pritchard Report on Quality Assurance in Mammography.[6] The lower benign biopsy rate has not resulted in a lower cancer detection rate.

DISCUSSION

The Forrest Report recommended that a single oblique mammogram should be used for screening. There have been various reports in the literature questioning the adequacy of single view mammography,[2-4] and advocating the use of two views to decrease the number of women recalled for assessment. A survey of the United Kingdom screening units that were operational in November 1989 revealed that 35% of centres were routinely employing two views during the prevalence round of the National Breast Screening Programme.[5] As it was predicted that the cost of the extra view could be offset by fewer recalls,[5] it was decided that two views should be performed in the Eastern Board during the prevalence screening round. All films are independently reported by two radiologists in accordance with the Pritchard Report on quality assurance in mammography[6] and in accordance with 67% of the United Kingdom breast screening centres.[7] The initial results of the Eastern Board Screening Programme are encouraging and the recall rate, benign to malignant biopsy rate and cancer detection rate exceed the Forrest expectations.

However, the response rate to the initial invitations for screening is disappointing, but not entirely unexpected as the uptake for cervical screening in Northern Ireland is also lower than the United Kingdom average. The lower recall rate for assessment is welcome, not only in terms of the reduction in assessment work-load, but in terms of the high anxiety generated by recall for assessment. The cost of the extra view is more than offset by this lower recall rate and hence reduction in the number of assessment clinics is required.[5]

As further experience is gained in fine needle aspiration cytology, definitive pre-operative diagnosis will result in a reduction in the number of diagnostic biopsies and a single surgical procedure encompassing wide local excision and axillary lymph node sampling will become more common. Further efforts in the field of health education and health promotion are required to improve the number of women attending for screening. The recent report from Edinburgh suggests that unless 70% of women attend for screening, a 30% reduction in mortality from screening cannot be achieved.[8] In view of the number of cancers being detected in the women who attend for screening, a greater response rate would lead to the ultimate goal of a greater reduction in the mortality from breast cancer.

The success of the Eastern Board Breast Screening Programme has been dependent on a multi-disciplinary approach involving radiologists, surgeons, and pathologists. The authors wish to thank Dr M McAuley, breast clinician who carried out most of the clinical examinations, Mr W Odling-Smee, Mr A J Wilkinson, Mr R A J Spence and Mr H Logan who provided surgical support, Dr P Watt and Dr L Caughley who provided the cytological support for the programme, and the radiographic staff for their high level of commitment.

The authors would particularly like to acknowledge the valuable role of Dr Patrick Watt, Consultant Pathologist, who worked tirelessly during the setting up and implementation of the programme. His untimely death on December 28th 1990 has deprived the Screening Programme in Northern Ireland of a devoted expert in the field of breast screening.

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A profile of residents of old people's homes

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SUMMARY

This paper describes the characteristics of the 450 residents of all statutory residential homes for the elderly within five local government districts in Northern Ireland. The residents are described in terms of demographic detail, prevalence of dementia and prevalence of problem behaviour. Results are comparable with those of other studies. There are more females, fewer are married and more are over the age of 75 years than would be predicted from the general population. Roughly half scored within the dementia range, with 56% of those over 85 years being demented. More than 33% had some degree of incontinence, 9% were immobile and 10% were physically aggressive at least once a week. Five percent were wanderers and nearly all residents required help with bathing.

INTRODUCTION

Studies in England,[1,2] Scotland[3] and Northern Ireland[4] have shown high levels of mental impairment and behavioural disability among the residents of old people's homes, and it has been suggested that the problem is increasing.[5] Phillips[6] has emphasised the pitfalls of assessing dependency, which is sometimes linked too simplistically with staff workload by policy makers. This study was carried out in the early stages of setting up a psychogeriatric service within five local government districts. The aim of the paper is to provide a profile of the residents of all statutory residential care units within the area in terms of demographic details, prevalence of dementia and the prevalence of problem behaviours.

METHOD

All long-stay residents living in statutory residential accommodation, with the exception of residents in homes for the elderly mentally infirm (EMI), within the five local government districts of Antrim, Ballymena, Larne, Carrickfergus and Newtownabbey were examined over a two week period. The area covered is mainly rural, but includes several large towns and a section of greater Belfast. The total population is 230,000. The study took place during March 1986 and this

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report is part of a larger series looking at all types of Board accommodation for the elderly in the area.[18] Statutory residential provision for the elderly in the area under the study comprises eleven old people's homes with 450 residents, two homes for the elderly mentally infirm (EMI) with sixty-two residents, twelve geriatric units with 420 patients and four psychogeriatric units with 91 patients.

Informed consent was obtained from those subjects deemed to be capable of giving it and for the remainder, consent was obtained from the officer in charge. Residents admitted for holiday relief were not included. A questionnaire was devised which comprised sections on (1) basic demographic details; (2) the information/orientation (I/O) subtest, and (3) the physical dependency (Pd) subtest of the survey version of the CAPE (Clifton Assessment Procedure for the Elderly), and (4) five further questions relating to wandering, aggression and incontinence. Section 1 was completed by a senior member of the care staff, section 2 by a member of the research team who interviewed the resident and sections 3 and 4 by the researcher in consultation with a staff member who was familiar with the resident's behaviour.

The CAPE (Clifton Assessment Procedure for the Elderly) survey is a simple and reliable test for assessing the degree of cognitive and behavioural impairment in elderly subjects. The I/O subtest which comprises twelve questions is the cognitive section and has been systematically validated.[7, 8, 9] against diagnosis. Scores of below 8 are found in patients with a diagnosis of either dementia or an acute organic brain syndrome. The Pd subtest gives information on mobility, self care and incontinence and its value lies in a description of the patient's physical dependency.[10]

Interviewers consisted of the authors and a team of junior doctors. A training session was given on the administration of the CAPE survey and the inter-rater reliability was assessed prior to the survey. The average correlation (Spearman rho) was 0·91 ($p = 0·005$). Inter-rater reliability for the 5 questions in section 4 was lower but was still acceptable at 0·7 ($p = 0·05$).

RESULTS

A summary of demographic details, prevalence of dementia and details of problems are shown in the Table. The population surveyed differed in a number of ways from the general population of the same group. There were fewer males than expected ($p < 0·001$). There were fewer residents aged 65 – 74 than would be expected from the general population and more aged 75 – 84 and 85 + ($p < 0·001$).

There were fewer married residents and more single and widowed ($p < 0·001$). The number of divorced people was very small, as in the general population. Fewer married residents were found at all ages ($p < 0·001$) and more single residents up to age 75 – 84 ($p < 0·001$). In the 85 + group there were still more single residents but the difference was less striking ($p < 0·05$). There were more widowed residents aged 65 – 74 ($p < 0·001$) but in the older age bands no significant differences were found.

TABLE

Characteristics of 450 residents of old people's homes in Co Antrim

Sex	Male 119 (26%) : Female 331 (74%)			
Age — yr	< 65	65 – 74	75 – 84	85 +
	12 (3%)	73 (16%)	201 (45%)	164 (36%)
Marital status	Widowed	59·5%		
	Single	35%		
	Married / Separated	5·5%		
	Divorced	0·2%		
Dementia	(< 8 on I/O scale of CAPE). 47·5% overall			
	< 65	65 – 74	75 – 84	85 +
	0	19 (26%)	103 (51%)	92 (56%)
Problem behaviours	Incontinent of urine or faeces	37%		
	Incontinent of faeces	16%		
	Wandering	5%		
	Immobile	9%		
	Physical aggression	10%		
	Requires help with bathing	93%		

DISCUSSION

Demographic details

The ages of the residents were in nearly equal proportions to those found by Pattie and Gilleard[12] and were similar to, though slightly younger than the residents in the Northern Ireland DHSS study.[4] This study replicates the findings of the DHSS study in that the distribution of ages of residents in old people's homes differs significantly from that of the general population, with the 65 – 74 group under-represented and the older age groups over-represented.

The sex distribution in our study also showed fewer males and more females than would be expected. It has been suggested that this results from the longer life expectancy of women, which makes it more likely that women will outlive their husbands, coupled with the expectations of our society that women will care for the male members of the family. Thus it may be that men have a greater chance of being cared for at home than women. Both Northern Ireland studies showed lower proportions of male residents than did a similar study in London.[1]

Marital status was broadly similar to other studies.[1,4] Fewer residents were married than would be expected from the general population and this held for all age groups. Presumably dependent elderly people who are married have a carer available at home and do not have to enter residential accommodation. Widowed and single people were over-represented in residential accommodation which is a predictable finding since by definition they are less likely to have a carer at

home. This over-representation became less marked in the older age groups, which was unexpected, especially for the widowed, and the reasons for this are not clear.

Dementia

Roughly half of our residents scored within the dementia range. This is similar to the figure found by Clarke[2] using the same assessment in Leicester. Masterton[3] considered that up to 66% of Scottish residents might be demented although this included those quite mildly affected who would have been excluded in our study.

Mann[1] considered that two-thirds of residents in his study had some degree of dementia. Wilkins[13] would suggest that most residential homes can successfully manage when 30% of the residents are confused, but in reality it appears that most homes have considerably higher proportions.

It is interesting to note that none of the under 65 age group scored within the dementia range. As expected, the proportion with dementia increased with age until in the over 85 age group, 56% scored less than 8 on the information/orientation section of the CAPE. It is worth pointing out however, that 42% of the over 85 age group did *not* show evidence of dementia.

Behavioural problems

Incontinence

More than one-third of residents had some degree of incontinence. This figure included all degrees of incontinence both faecal and urinary and was obtained from the Pd sub-test of the CAPE survey. This is virtually identical to the figure reported by Masterton[14] in Scotland using the same assessment, and similar to the figure reported by Tobin and Brocklehurst.[15]

The result for faecal incontinence alone was also comparable with previous studies.[16, 17] As elsewhere discussed,[18] intractable faecal incontinence can be seen as an indication that the resident might be more appropriately placed in a unit with nursing input such as a psychogeriatric continuing care ward. However, it has been demonstrated that appropriate management can significantly reduce the prevalence and severity of faecal incontinence in residential accommodation.[16]

Wandering

Relatively few residents were wanderers, which may reflect the fact that there are local homes for the elderly mentally infirm (EMI) to which wandering residents can be transferred. It may also be an indication that wandering is behaviour which staff in residential care find difficult to deal with so that wanderers become a high priority for transfer.

Immobility

Immobile residents present a considerable burden for care staff. Nine percent were unable to walk and yet of these 22% were found to be relatively independent and were suited to living in residential accommodation. This dependent immobile group might be more appropriately managed by the geriatric services.

Aggression

The finding that 10% were physically aggressive at least once a week was surprising, and this must have required high staff tolerance. We have no information about trigger factors or other circumstances of the aggression. Little research has been done on this important topic.

Help with bathing

Ninety-three percent of the residents received help with bathing, which takes up a considerable proportion of staff time. This high level of support may be a reflection of staff members' perception of their legal responsibility.

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Hepatitis delta virus infection in Northern Ireland 1970 – 1989

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SUMMARY

The incidence of hepatitis delta virus (HDV) infection in Northern Ireland (1970 – 1989) was tested by enzyme linked immunosorbent assay in 401 hepatitis B surface antigen (HBsAg) positive sera. Hepatitis delta antigen (HDAg) was tested in 388 patients and antibody to delta antigen (anti-HD) in 401 patients. Four patients (1·03%) were HDAg positive. Nine patients (2·24%) were positive for anti-HD and after acid pre-treatment of sera from eight of these patients, five were positive for HDAg. The overall incidence of HDV markers was 3·27%, which reflects the low incidence in HBsAg carriers in Northern Ireland (who were in high risk groups for delta hepatitis). The use of acid treatment of the sera to break up antigen / antibody complexes has been a useful technological improvement in the identification of this virus.

INTRODUCTION

The hepatitis delta virus is unique among virus-like agents. It is a defective virus that requires active helper functions from the hepatitis B virus (HBV) for its replication. The hepatitis delta virus is approximately 36nm in diameter with an RNA core and an HBsAg coat. Infection with HDV, therefore, may occur in patients with acute or chronic HBV infections and in the latter is often associated with severe and progressive liver disease, including chronic active hepatitis and cirrhosis. HDV has also been implicated in cases of fulminant hepatitis, occasionally in epidemic form. The incidence of delta virus infection in certain hepatitis B virus populations may be used as a surrogate indicator of intravenous drug use.

PATIENTS, MATERIALS AND METHODS

Four hundred and one HBsAg positive sera were stored at −20°C from 1970 – 89. Three hundred and eighty eight were tested for the presence of HDAg and 401 for anti-HD by enzyme linked immunosorbent assay (ELISA). These included sera from cases of hepatitis from all parts of Northern Ireland and carriers discovered by screening of blood donors and ante-natal patients by

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the Northern Ireland Blood Transfusion Service. Nineteen sera from haemophiliacs with hepatitis B antibodies (anti-HB_S) were also studied and tested for anti-HD.

The Organon Teknika Hepanostika anti-Delta Microelisa test was used. The HDAg test was based on a direct "sandwich" using 6% Tween 20 and overnight incubation at room temperature. The anti-HD test was based on a competitive "sandwich" inhibition method. Sera from eight patients with anti-HD were pre-treated with 0·5N HCl as previously described[1] for detection of HDAg. Sera which tested positive for HDAg or anti-HD were repeat tested.

RESULTS

Three hundred and eighty-eight HBsAg positive sera were tested for HDAg and 401 HBsAg positive sera and 19 anti-HB_S positive sera were tested for anti-HD. The groups of patients with positive HDV markers are shown in Table I.

TABLE I

Groups of HBsAg positive patients showing evidence of HDV infection

Group	*Tested*		*Positive*		*% Positive*	
	HDAg	*Anti-HD*	*HDAg*	*Anti-HD*	*HDAg*	*Anti-HD*
Haemophiliacs	9	28*	0 (1)**	2	0 (11·1%)**	7·1%
Intravenous drug abusers	20	20	1	0	5·0%	0
Post surgery	21	21	0 (1)**	1	0 (4·8%)**	4·8%
Foreign-born adults or foreign contacts	141	153	3 (3)**	4	2·1 (2·1)**	2·6%
Blood donors	47	47	0	2	0	4·3%

*Includes sera from 19 haemophiliacs with anti-HB_S.

**Figures in brackets show additional HDAg positive sera after acid pre-treatment.

The results show that the highest incidence of HDV infection was in haemophiliacs followed by intravenous drug abusers, post surgery, foreign-born adults and foreign contacts, and blood donors. Other groups of patients including health care workers, recipients of multiple transfusions, sexual or perinatal contacts, the recently tattooed, antenatal patients or organ donors did not show evidence of HDV infection.

Further details of the patients positive for HDV markers are shown in Table II.

DISCUSSION

The epidemiology of HDV infection is closely linked to the epidemiology of HBV infection. There is a lower incidence of HBV infection in Northern Ireland than in the rest of the United Kingdom,[2] and one would expect the incidence of HDV infection to be lower. In addition there has been a marked fall in HBV infections in the United Kingdom since 1984,[3] probably due to publicity about AIDS which will further decrease the risk of HDV infection.

The highest incidence of HDV infection was seen in haemophiliacs, which correlates with their need for transfusions or blood products. HBsAg infection in these patients has not occurred since 1982, probably due to more sensitive HBsAg screening of blood.[2]

TABLE II

Patients with evidence of HDV infection

Date	*Age*	*Sex*	*Groups*	*Clinical status*
HDAg Positive				
1976	25	M	Intravenous drug abuser (London)	Acute hepatitis (1976)
1982	8	M	Vietnamese	HBsAg carrier
1986	35	M	Laboratory worker (Guyana)	Acute hepatitis (1985)
1986	64	F	Hepatitis acquired 8 years previously in Greece	Chronic active hepatitis
Anti-HD Positive				
1974*	21	M	Haemophiliac	Acute hepatitis (1972)
1987	53	M	Haemophiliac	Acute hepatitis (1973)
1982*	59	M	Surgery in previous 2 years	Cirrhosis
1981*	27	M	Ethiopian	Acute hepatitis
1988*	40	M	Iranian (previous hepatitis in Africa)	Chronic active hepatitis
1983*	27	M	Chinese	HBsAg carrier
1988	26	M	Gilbert Islands citizen	HBsAg carrier
1986	42	F	Blood donor	HBsAg carrier
1979	—	M	Blood donor	HBsAg carrier

*HDAg positive after acid pre-treatment of sera.

There is a small but not negligible risk of HBV infection from HBsAg negative, HB core antigen (HBcAg) positive blood not detected by screening for HBsAg in donated blood. The risk of transmission of HDV infection in this way is even lower, and additional testing of HBsAg negative blood for HDV is unlikely to reduce this risk since HDV serum markers detected usually reflect past rather than current infection. The HBsAg positive recipient, however, is at high risk for HDV infection from HBcAg positive blood.[4]

Only 20 HBsAg positive drug abusers were available for study and one (5·0%) had HDV antigen. This patient acquired his HDV infection in London. Intravenous drug abuse is a small problem in Northern Ireland.[5] Hepatitis associated with HDV infection was first found among intravenous drug abusers in Italy. Studies in the United Kingdom and Republic of Ireland (West of Scotland,[6] South East London,[7] Merseyside[8] and Dublin[9]) have shown that HDV infection is largely confined to intravenous drug abusers and their social and sexual contacts.

The post-surgical patient with HDV markers in this study presented with cirrhosis of unknown origin. The only known risk factor was a total hip replacement two years previously. There were no apparent sources of HDV infection for the two blood donors found to be positive.

About one third of HBsAg positive patients in Northern Ireland were foreign-born or had foreign contacts, and most of these were of Chinese or Vietnamese origin.[2] Half of the patients with HDV markers in Northern Ireland (7/13) were foreign-born or had contact with HBV in a foreign country. In our study only two patients from the far east had evidence of HDV infection. It is not known why HDV infection is uncommon in HBsAg carriers in South East Asia and China where the

prevalence of HBV infection is very high. Delta virus infection is endemic in certain populations and is especially common in the Mediterranean area and the middle east, the highest prevalence being reported from Kuwait and Saudi Arabia. The health care worker in our study was a laboratory worker in Jamaica and also in Georgetown, Guyana, which is proximal to known epidemic foci. There are known epidemic foci in Colombia,[10] Venezuela[11] and the Amazon basin, but delta hepatitis is rare in Northern Europe, the United States and most of South America. One patient in the study was from the Gilbert Islands. The incidence of HDV infection in the Western Pacific region is very low apart from high prevalence foci in Polynesia and Micronesia.[12]

Delta virus infection can only occur in the presence of existing HBV infection, but HDV interferes with the replication of HBV.[13] Clinically, delta virus hepatitis resembles other forms of acute and chronic hepatitis but it tends to be more severe. Acute delta hepatitis occurs in two forms. In co-infection HBV and HDV are acquired together and the clinical picture is indistinguishable from acute HBV hepatitis, but there is a higher incidence of fulminant hepatitis with a higher mortality. In superinfection, acute HDV infection occurs in a chronic HBV carrier which often leads to chronic hepatitis. Chronic delta hepatitis usually progresses from superinfection and may have a rapid course to cirrhosis. The diagnosis of acute HDV infection rests on detection of HDAg in blood in the first three or four weeks of illness, or the presence of anti-HD which appears on average more than four weeks later. Acid pre-treatment of sera containing anti-HD in our study showed that an anti-HD/HDAg complex was present. The HDAg was split off at acid pH and could then be detected, but it would not be known if it was infectious. In chronic HDV infection, HDAg may be detected in serum by immunoblotting although it may be complexed with antibody.[14] In HDV infected HBsAg carriers, high titre IgM anti-HD is a useful indicator of chronic HDV infection and will distinguish between patients with chronic HDV infection and those with previous exposure.[15] Comparison of five HDV assays showed that the Organon Teknika assay as used in this study was the most sensitive for HDAg detection.[16] The use of acid treatment of the sera to break up antigen/antibody complexes has been a useful technological improvement in the identification of this virus.

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Non-arterial assessment of blood gas status in patients with chronic pulmonary disease

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SUMMARY

Assessment of blood gas status is important in the management of patients with chronic pulmonary disease. Arterial puncture is often painful and may damage the arterial wall. Measurement of oxygen saturation by transcutaneous oximetry offers a non-invasive alternative to arterial methods but does not allow assessment of partial pressure of carbon dioxide. We have examined the value of oximetry and dorsal hand venous carbon dioxide as an alternative to arterial puncture. Transcutaneous oxygen saturation correlated with arterial oxygen saturation ($r = 0 \cdot 76$, $p < 0 \cdot 001$) with an error of 2·1% and dorsal hand venous carbon dioxide tension correlated with the arterial tension ($r = 0 \cdot 84$, $p < 0 \cdot 001$) with an error of 8%. Changes in oximetric oxygen saturation and venous carbon dioxide tension following oxygen therapy reflected arterial values. Assessment of blood gas status using oximetry and dorsal hand venous carbon dioxide tension is a useful alternative to arterial puncture.

INTRODUCTION

The measurement of arterial blood gases in patients with chronic pulmonary disease is important in both diagnosis and management.[1] Arterial puncture is, however, a painful procedure and may occasionally damage the arterial wall.[1, 2, 3, 4] It would be of benefit to patients if blood gas status could be assessed by less invasive methods, particularly if repeated measurement is required. Transcutaneous oximetry which measures oxygen saturation (SO_2) by the absorbance of two wave lengths of light is an accurate non-invasive method to assess oxygenation.[5, 6] However, it is often important to know arterial carbon dioxide tension ($PaCO_2$), which reflects abnormalities of ventilation and this requires arterial puncture. In this study we have examined the reliability of assessment of blood gas status using ear oximetry for measurement of arterial oxygen saturation and dorsal hand venous partial pressure of carbon dioxide ($PvCO_2$) for estimation of arterial partial pressure of carbon dioxide.

METHODS

Forty-eight patients aged 62 ± 12 years (mean ± SD) with chronic pulmonary disease (12 with pulmonary fibrosis and 36 with chronic obstructive lung disease)

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were studied in hospital during recovery from an acute exacerbation of their condition. Subjects sat comfortably for at least thirty minutes breathing room air connected to an ear oximeter (Biox II).[5, 6] Simultaneous blood samples were taken anaerobically from the radial artery and from a dorsal hand vein and oxygen saturation was recorded from the ear oximeter (SeO_2). Both blood samples were analysed immediately for blood gases and pH. In 24 of the patients this procedure was repeated following the administration of oxygen via nasal spectacles at 21/min for one hour.

Arterial oxygen tension (PaO_2) was converted to saturation (SaO_2) using the method of Severinghaus which includes corrections for pH and $PaCO_2$.[7] Values obtained from the different methods of measurement were then compared using a paired 't' test. The agreement between the variables methods was assessed by calculation of the coefficient of correlation by the least squares method and the error standard deviation and coefficient of variation (CV) as described by Bland.[8]

RESULTS

No significant difference was observed between the arterial and venous CO_2 tensions ($PaCO_2$ 41 ± 9·5 mmHg, $PvCO_2$ 42 ± 10·6 mmHg), and the two were closely related ($r = 0{\cdot}84$, $p < 0{\cdot}001$; Fig 1). The error standard deviation

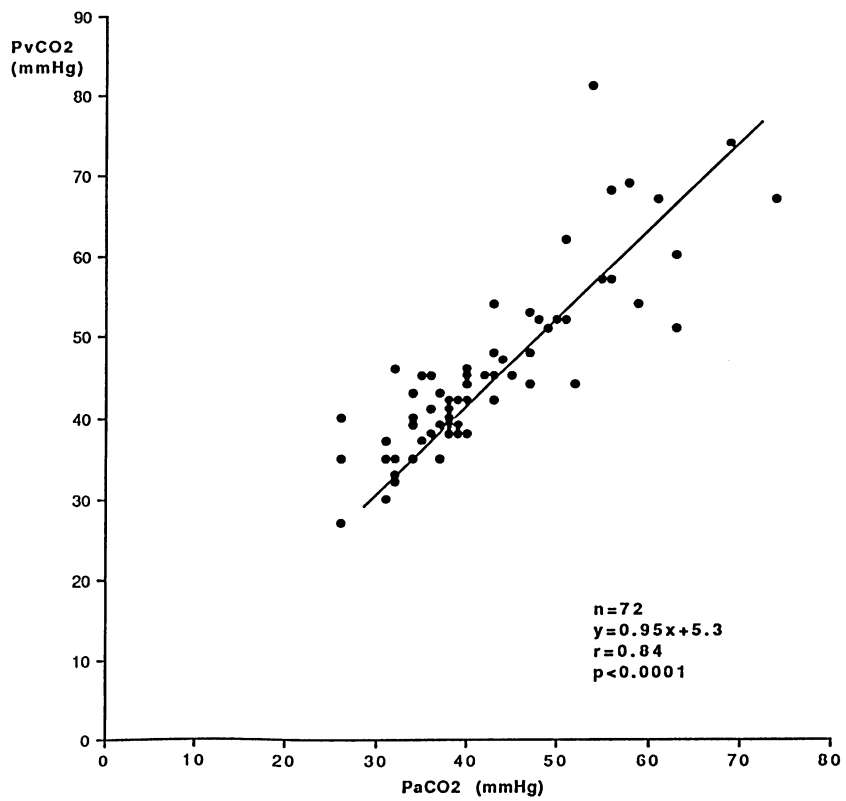

Fig 1. Relationship between dorsal hand venous ($PvCO_2$) and arterial ($PaCO_2$) tension of carbon dioxide. The line of regression is shown.

for PCO_2 was 3·5 mmHg and the coefficient of variation was 8%.[8] No significant difference was observed between earlobe oxygen saturation (SaO_2 93 ±5%, SeO_2 94 ±5%, and the two were also closely related ($r = 0·76$, $p < 0·001$; Fig 2). The error standard deviation for SO_2 between methods was 2·1% and the coefficient of variation was 2·3%. Following the administration of oxygen ($n = 24$) there was a significant increase in SaO_2 from 90 ±4·1% to 95 ±2·7% ($p < 0·001$). A similar increase in SeO_2 from 92 ±55·1% to 96 ±3·1% ($p < 0·001$) was also observed. Following O_2 therapy there was no significant change in $PaCO_2$ (39 ±9 to 42 ±9 mmHg) or $PvCO_2$ (40 ±9 to 44 ±10 mmHg).

DISCUSSION

Arterial blood gas determination, though the standard for assessment of hypoxia and hypercapnia, presents a number of difficulties. Arterial puncture is painful in over 25% of patients and causes bruising in 60%.[3] The procedure may also be traumatic, resulting in direct arterial damage.[4,9] In hypoxic patients it is sometimes difficult to determine if a sample is arterial or venous in origin and results may be discarded or considered to be misleading.

Transcutaneous oximetry is a simple and accurate method of assessing oxygenation in patients with compromised respiratory function. It is non-invasive and

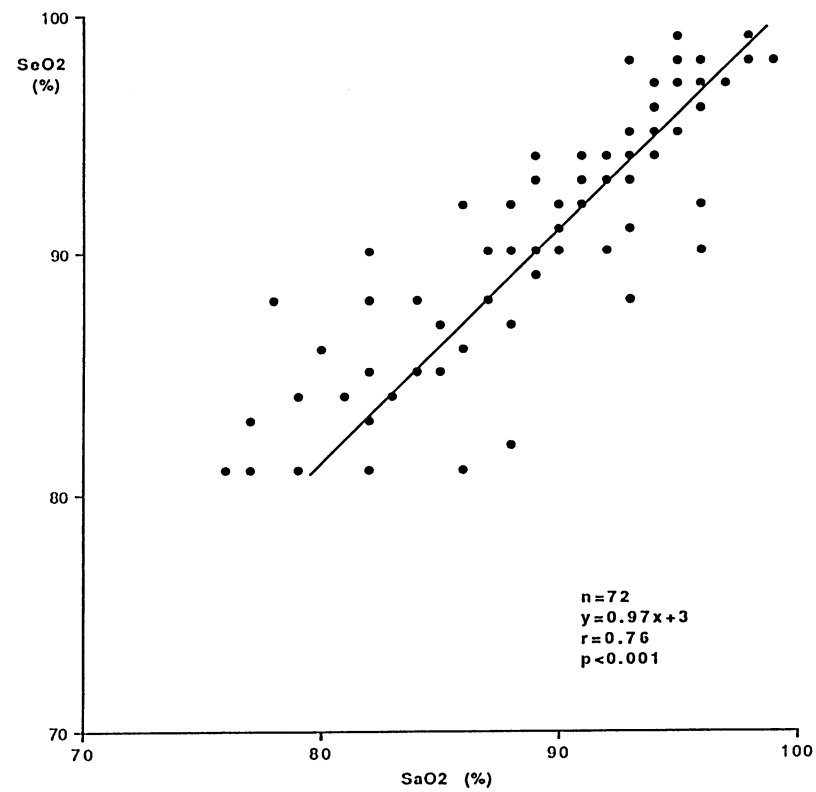

Fig 2. Relationship between ear oximetry (SeO_2) and arterial blood gas (SaO_2) estimations of oxygen saturation. The line of regression is shown.

allows continuous monitoring of oxygen saturation, but provides no information regarding carbon dioxide tension. In conditions where hypoventilation or ventilation : perfusion mismatching occur, hypercapnoea may develop following oxygen therapy. This is potentially dangerous as carbon dioxide narcosis will further reduce respiratory drive and may result in coma and death.[10] It is therefore important to monitor carbon dioxide levels in such patients and this usually requires arterial puncture.

We have shown good agreement between direct arterial measurement of oxygen saturation and saturation determined by ear oximetry, confirming the utility of this non-invasive method.[5, 6] The coefficient of variation of the measurements is small and in general within the variability of the machine.[6] Similarly, there was good agreement between $PaCO_2$ and $PvCO_2$ in blood from a dorsal hand vein. When dorsal hand venous blood is arterialised using a hand warming device, gas tensions are similar to arterial blood.[11] Many patients with chronic pulmonary disease have carbon dioxide retention, and are already vasodilated, so no arterialisation procedure need be undertaken. The coefficient of variation for the difference between methods is within the assay variation for $PaCO_2$, (4 – 12%).[12] Oximetric measurement of saturation tended to underestimate blood gas values by 3%, and venous assessment of PCO_2 overestimated by 5 mmHg. However, both methods were accurate in detecting changes following oxygen therapy when the error for PCO_2 was 2·3% and PaO_2 was 5%.

In conclusion we have shown good agreement between venous and arterial measurement of CO_2 tension, and between arterial and oximetric measurement of O_2 saturation. Venous blood sampling and ear oximetry are less invasive than direct arterial puncture, and the information obtained accurately reflects blood gas status. These relatively simple investigations should be of value when monitoring patients with chronic pulmonary disease.

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Evidence of chlamydia infection in a Belfast antenatal population

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SUMMARY

Chlamydia trachomatis *is an important cause of postpartum endometritis and neonatal conjunctivitis. However, the prevalence of chlamydial genital infection varies considerably from one population group to another. A study was thus conducted to determine the incidence of* C trachomatis *infection of the cervix in an unselected group of women attending a Belfast antenatal clinic. One hundred and six patients were screened for evidence of current cervical infection with* C trachomatis *or serological evidence of past infection.* C trachomatis *was identified in 2·9%, and there was evidence of past infection in 18·9%. No significant risk factors were identified from gynaecological, contraceptive or sexual histories.* C trachomatis *infection was treated with erythromycin and there were no perinatal complications ascribed to chlamydia.*

INTRODUCTION

Chlamydia trachomatis is a common sexually transmitted pathogen which may have important implications in pregnancy. It has been proposed as a cause of premature rupture of the membranes,[1,2] intrauterine growth retardation and preterm delivery.[3] Following delivery it may cause endometritis in the mother,[4] and conjunctivitis and pneumonitis in the neonate.[5]

As with other sexually transmitted diseases, the incidence of genital chlamydial infection varies significantly from one geographical area to another, and between population subgroups within a given area. The reported incidence of *C trachomatis* infection of the cervix in antenatal patients ranges from 2·3% in an unselected group of Dutch women[6] to 27% in Baltimore adolescents.[7] Relatively few antenatal studies have been performed in the British Isles, and none had previously been undertaken in Northern Ireland.

The aims of this study were thus to determine the incidence of current *C trachomatis* infection of the cervix and the prevalence of past *C trachomatis* infection in a Belfast antenatal population, and to see if either was associated with adverse pregnancy outcome or postnatal and neonatal morbidity. We also looked

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for a correlation between aspects of sexual history and evidence of chlamydial infection to see if there were any indentifiable risk factors.

PATIENTS AND METHODS

The patients studied were 106 women attending for their antenatal booking visit at Jubilee Maternity Hospital, Belfast, between March and July 1989. A detailed history was taken, including age, parity, number of spontaneous or therapeutic abortions, previous contraceptive usage, history of previous sexually transmitted disease or abnormal cervical cytology, age of first coitus, and number of sexual partners since first coitus. In addition to routine examination, a speculum examination was performed and a dacron-tipped swab was rotated in the endocervix. The swab was then rolled over the centre well of a MicroTrak slide (Syva, UK) which was fixed in acetone. The slides were sent to the regional virology laboratory where the direct fluorescent antibody test was performed. This involves overlaying each slide with fluorescein-labelled monoclonal antibody prior to fluorescent microscopy ($\times 40$ objective). The presence of 5 or more chlamydia elementary bodies was considered as a positive result.

Ten millilitres of blood was also taken from each patient and forwarded to the regional virology laboratory. The serum was stored at $-20°C$ prior to being forwarded in batches to the Institute of Ophthalmology in London, where micro-immuno-fluorescence was performed to determine IgG and IgM titres to the D – K serovars of *C trachomatis.*

Verbal consent was obtained for taking the additional samples required for the study. Those in whom the MicroTrak slide was positive were treated with a two-week course of erythromycin 250 mg qid, and their partners were treated concurrently.

RESULTS

The mean age of the patients was 26 years; 56 were nulliparous and 50 were parous, with a range of parity from 0 – 7. A history of previous spontaneous abortion was given by 13·2%, and 2·8% had previously undergone termination of pregnancy. With regard to previous contraceptive usage, 62·3% had used the oral contraceptive pill and 2·9% an intrauterine contraceptive device (IUCD); 27·4% had used barrier methods and 25·5% had never used any contraception. Only 3 patients gave a history of previous sexually transmitted disease, and none gave a history of abnormal cervical cytology.

The average age at first coitus was 19 years, with a range from 14 – 29 years. The distribution of total number of sexual partners is shown in Table I.

TABLE I

Lifetime number of sexual partners in 106 patients

No of partners	*No of patients*	*Percent*
1	47	44·3
2 – 5	51	48·1
6 – 10	6	5·7
> 10	2	1·9

Of the MicroTrak slides submitted, all but two were suitable for fluorescent microscopy. Chlamydia elementary bodies were identified in only three cases, representing an incidence of cervical infection of 2·9%. By contrast, 18·9% of the patients had positive serology, suggesting that they had been infected with *C trachomatis* in the past (Table II). Positive serology was considered to be an IgG or IgM titre to *C trachomatis* D – K of $\geq$ 1/16.

TABLE II

Results of tests for C trachomatis *antigen and antibody*

		No of tests	*Positive result*	
			Number	*Percent*
MicroTrak		104	3	2·9
Serology	IgM	106	2	1·9
	IgG	106	19	17·9
	IgM or IgG	106	20*	18·9

*One of the two patients with a positive IgM titre had a negative IgG titre.

There was no correlation between positive identification of chlamydia, or positive serology, and expected risk factors such as young age, previous termination of pregnancy or IUCD use, history of sexually transmitted disease, age at first coitus or lifetime number of sexual partners.

All 106 pregnancies resulted in the birth of a live infant and there was only one case of preterm labour. Five of the neonates developed conjunctivitis prior to discharge from hospital. *Staphylococcus aureus* was isolated in three cases, and cultures were negative in the other two. MicroTrak slides were negative in all five.

Eight patients developed postpartum endometritis, but there was no correlation between this and evidence of chlamydial infection either in the past or during the pregnancy.

DISCUSSION

The incidence of current *C trachomatis* infection of the cervix in this study was 2·9%, which is low in comparison with most other studies in the world literature. It was notably lower than the 7% infection rate reported in a similar study in Liverpool,[8] but comparable to that of 2·5% in a study in Cardiff.[9] A strong bias towards infection in the younger age groups has been noted in other studies.[10, 11] This did not hold true in the present study; the three patients in whom infection was identified were aged 21, 22 and 35 years. However, the lack of correlation with demographic factors and aspects of sexual history was not surprising with such a low detection rate. This highlights the difficulties involved in trying to make screening more selective in low prevalence areas.

It was perhaps more surprising that there was no correlation between expected risk factors and serological evidence of past infection. The relative infrequency of previous termination of pregnancy, IUCD use and previous sexually transmitted disease may have influenced this, as may the relatively high average age at first coitus and generally low number of sexual partners. These, we feel, are features

which may be particular to Northern Ireland due to generally conservative attitudes, and also because the 1967 Abortion Act does not apply here.

In this study there were few complications of pregnancy and a low incidence of postnatal and neonatal morbidity. This may have been influenced by antenatal treatment of the three infected women. However, other workers who performed studies in which infected mothers were not treated antenatally have also shown no adverse effect on pregnancy outcome.[11-13] In view of this, and the possibility of reinfection, it has been suggested that antenatal screening should be performed between 34 and 38 weeks.[14] This should be effective in preventing postnatal and neonatal complications. However, the neonatal complications are generally mild and respond promptly to erythromycin. Thus, in such a low prevalence area as Northern Ireland, and in the absence of identifiable risk factors, the value of routine antenatal screening for *C trachomatis* is questionable.

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Prophylactic oophorectomy in Northern Ireland

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SUMMARY

A postal questionnaire was sent to all gynaecological consultants and senior registrars (n = 50) in Northern Ireland to establish the prevalence of prophylactic oophorectomy. Forty three (84%) replied. 72% performed prophylactic oophorectomy (28% unilateral), 28% did not. With reference to the world literature, there appears to be no benefit from the unilateral procedure but a consensus that bilateral oophorectomy is an option which should be considered in certain cases where there is a high risk of ovarian cancer.

INTRODUCTION

Each year in Northern Ireland there are 150 new cases of ovarian carcinoma.[1] This is the fifth commonest cause of cancer-related death in Northern Ireland, with approximately 90 deaths per year. Ovarian carcinoma is responsible for 4 – 5% of deaths in females below the age of 60,[2] and the death rate from ovarian carcinoma exceeds that of the cervix and the uterine corpus combined.

This cancer presents late, in less than 30% of cases being confined to the ovaries at the time of diagnosis. Unlike the cervix and breast, the ovary is a hidden organ which does not lend itself to simple examination, so late presentation with advanced disease and poor prognosis is the rule. Early diagnosis can be improved by screening all women, or at-risk populations. Cervical smears and clinical pelvic examination are insensitive screening investigations. Tumour markers such as Ca-125 could provide a useful screening technique but have not yet been proved to be effective.[3] Abdominal ultrasound[4, 5] and transvaginal colour flow imaging[6] are being evaluated and may prove to be effective screening tools in the future.

Traditional treatments are at best poor, with a five year survival of less than 25% and newer therapies such as monoclonal antibody directed chemotherapy and radiotherapy are still largely experimental. For many years it has been suggested that the incidence of ovarian cancer could be reduced if prophylactic oophorectomy was performed on women undergoing pelvic surgery. Many factors must be considered including the patient's age, menopausal status, presence of carcinogenic risk factors and contraindications to hormone replacement therapy. The procedure of prophylactic oophorectomy is therefore a delicate balance between the risk of developing ovarian cancer and the consequences of removing

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normal ovaries. This study was undertaken to establish the current practice of prophylactic oophorectomy in Northern Ireland.

METHODS

In Northern Ireland there are seventeen hospitals which perform gynaecological surgery. A postal questionnaire was sent to all consultant gynaecologists ($n = 42$) and gynaecological senior registrars ($n = 8$). In order to encourage the response rate, replies were anonymous and postage was prepaid. This study was carried out during a six week period of 1988.

RESULTS

Forty three (84%) replies were received and the results are summarised in the Table. Prophylactic oophorectomy during hysterectomy was performed at some time by up to 72% of gynaecologists. Their practice was dependent on the patient's age and menopausal status, with a natural transition appearing between the ages of 40 and 45. Unilateral prophylactic oophorectomy was carried out by 28% of the sample and was generally performed when the patient was aged between 40 and 45 years.

A second group of surgeons (26%) never removed normal ovaries as a prophylactic procedure during hysterectomy.

If prophylactic oophorectomy was performed before the menopause 12 (57%) prescribed hormone replacement therapy, whereas 7 (33%) prescribed this only if the patient became symptomatic. Two surgeons (10%) used oestradiol implants at the time of surgery.

TABLE

Prophylactic oophorectomy questionnaire: (43 replies from 50 gynaecologists circulated in Northern Ireland)

Question	Answer — yes	
	n	%
Bilateral prophylactic oophorectomy?		
Post-menopausal	31	72%
Pre-menopausal		
Age > 50	20	48%
Age > 45	12	28%
Age > 40	2	5%
Age ≤ 40	0	—
Never remove normal ovaries?	12	28%
Unilateral prophylactic oophorectomy?	12	28%

DISCUSSION

One of the most frequent yet still controversial decisions to be made when performing a hysterectomy is whether to remove or retain the normal ovaries. This decision is often made using subjective prejudices, perhaps during the

surgical procedure itself. From this study it appears that there is wide variation in attitudes to prophylactic oophorectomy, a finding which is not unique to Northern Ireland.[7] A review of the literature indicates that the need for prophylactic oophorectomy has been questioned many times, with no clear answer.[8]

How many patients with retained ovaries actually develop carcinoma of the ovary? Jacobs and Oram[9] recently reviewed twelve studies in which the average incidence of cancer in retained ovaries, after surgery for benign gynaecological disease, was 0·2%. This seems a very small and quite acceptable figure. However, all of these studies suffer from the fact that long term (greater than 10 years) follow-up is difficult due to population mobility, and a woman may die from an unrelated disease and an ovarian tumour remain undiscovered. The second approach is to examine how many patients with ovarian carcinoma have undergone previous pelvic surgery where prophylactic oophorectomy could have been performed. Studies of this question give figures ranging from 4·5%[10] to 14%,[11] an average figure from twelve studies is 10%.

In practical terms, if prophylactic oophorectomy were performed as a routine at pelvic surgery approximately 400 lives would be saved in England and Wales, where over 4000 women die each year, and at least nine per year would be saved in Northern Ireland. Prophylactic oophorectomy would also eradicate benign ovarian disease, pain from residual ovarian syndrome and would reduce the morbidity associated with further surgery.[12]

If functioning ovarian tissue is removed, then hormone replacement therapy is indicated. Premature removal of ovarian steroids may or may not be adequately replaced by current replacement therapy, but if there are no contraindications it is now largely accepted that the psychological, cardiovascular and musculoskeletal benefits of such therapy outweigh the risks.[13] The ovarian stroma retains some function after the menopause but there is only a small endocrine contribution. Prophylactic removal of post-menopausal ovaries should therefore not cause any endocrine problems as most post-menopausal oestrogen comes from peripheral conversion of adrenal androgen.

The aetiology of ovarian cancer remains unknown but it occurs in association with an early menarche, late menopause, previous mumps infection and pelvic irradiation. One of the most convincing theories was postulated in 1972 by Fathallah[14] who suggested that the trauma of incessant ovulation may predispose to the development of cancer. Ovulation suppression by pregnancy, lactation and oral contraceptive use may therefore be protective, but the prophylactic removal of just one ovary in the pre-menopausal woman would lead to a relative increase in ovulation in the remaining ovary which might possibly increase the neoplastic risk.[15]

Opponents of prophylactic oophorectomy suggest that, using these arguments, general surgeons should perform prophylactic mastectomy to reduce breast carcinoma and remove testicles at the time of inguinal hernia repair. In reply, it should be remembered that the ovary is a hidden organ, in which cancer is more comparable to that of the pancreas than to cancer of the breast or testis.

In the absence of better diagnostic and therapeutic procedures for ovarian disorders, I would suggest that prophylactic oophorectomy be used to reduce

both benign and malignant ovarian disease. It should be considered by all those operating in the female pelvis and should be planned prior to surgery with the patient partaking in the decision-making process. Current gynaecological practice in Northern Ireland shows that a majority of surgeons consider that ovaries should be removed during any pelvic surgery after the menopause and that in the pre-menopausal patient over the age of 40, prophylactic oophorectomy is an option which must be considered, especially if there is a strong family history of ovarian cancer or there are other high-risk features. Regarding the practice of unilateral prophylactic oophorectomy, review of the literature reveals no benefit from performing such a procedure and in theory it may even be detrimental.

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Problems in day care surgery

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SUMMARY

In-patient admission represents a failure of a day care service. The hospital records of 105 patients transferred from the day ward to the in-patient wards were studied retrospectively. Of 2,039 patients treated in the day care ward, 105 (5%) required in-patient admission over a 12 month period. Of these 105 admissions, 17% did not fulfil the criteria for day care patients, 46% had surgical problems, and 35% anaesthetic-associated problems. The in-patient admission rate could be reduced by improved out-patient selection of cases, use of a separate day care theatre, increased use of local anaesthetic techniques, reduction in the use of parenteral opioids, the use of simple oral analgesics or non-steroidal anti-inflammatory agents as pre-emptive analgesia and a wider use of propofol as an induction agent which provides superior recovery from anaesthesia.

INTRODUCTION

Interest in day care surgery has increased in recent years for various reasons, including improved surgical and anaesthetic techniques, increased efficiency, patient demand and financial constraints. The day care unit in this hospital was opened in January 1989. There are 12 beds available for gynaecological, plastic, orthopaedic and general surgical procedures. The guidelines for the use of the unit are shown in Table I.

Patients are assessed at the surgical out-patient clinic for suitability as day patients and a comprehensive pre-operative assessment form is filled in when the patient comes to the unit.[1] There is no separate day care theatre and the day cases are included in the main theatre lists. The unit guidelines for safe discharge are shown in Table II.

This paper reports on the rate of in-patient admission from this unit, the reason such admissions were necessary, and on the relationship of the anaesthetic morbidity to the anaesthetic agents used.

METHOD

Nursing staff in the day unit tabulate the reasons for all transfers to the in-patient wards. The hospital records of these patients over the 12 month period (1st January – 31st December 1989) were obtained and studied.

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TABLE I

Agreed guidelines for use of day surgery unit at the Ulster Hospital

1. Ward to be open from 8.00 am until 5.00 pm, Monday to Friday.
2. Patients to be booked 48 hours in advance, otherwise bed can be re-allocated.
3. No emergency admissions unless for discharge same day.
4. Admitting consultant surgeon or anaesthetist in charge of case will be responsible for disposal of patient at 5.00 pm.
5. Patient to be accompanied home by a responsible adult and not to be left alone till next day.
6. Patients to be under 70 years of age.
7. Patients to live within 20 miles of hospital.
8. Patients considered to be fit and healthy.
9. Procedures normally to last less than 30 minutes and severe pain or haemorrhage not expected.
10. Patients to fast overnight.
11. No patients to receive a general anaesthetic after 2.30 pm.

TABLE II

Guidelines for safe discharge after day surgery

1. Patient must have a responsible adult to escort him/her home and stay with him/her at home.
2. Patient's vital signs must have been stable for at least one hour.
3. Patient must have no evidence of respiratory depression.
4. Patient must be —
   - Orientated to person, place and time
   - Able to dress himself/herself
   - Able to walk out without assistance
   - Able to retain orally administered fluids
   - Able to void.
5. Patient must not have —
   - More than minimal nausea or vomiting
   - Excessive pain
   - Bleeding.
6. Patient should stay at least 1 – 2 hours after extubation.
7. Patient must have written instructions for the post-operative period at home.

RESULTS

The procedures performed were grouped into seven categories: anaesthetic (patients requiring central blocks for the treatment of chronic pain) 1%, general

medicine (endoscopies) 7%, general surgery 37·5%, gynaecological surgery 31%, orthopaedic 11%, plastic 3·7% and maxillofacial surgery 8·7%. Table III shows a summary of the procedures carried out on the 2,039 patients passing through the unit in the first year.

TABLE III

Procedures carried out on day surgery patients

	Anaesthetic	*General medicine*	*General surgery*	*Gynaecological surgery*	*Orthopaedic surgery*	*Plastic surgery*	*Maxillofacial surgery*	*Total*
All patients	21	145	764	633	225	76	175	2039
	1·0%	7%	37·5%	31%	11%	3·7%	8·7%	
Patients admitted		1	38	25	25	6	10	105
		1%	36·2%	23·8%	23·8%	5·7%	9·5%	

Of the 2,039 treated in the day care unit, 105 (5%) subsequently required transfer to the appropriate surgical ward. Of these, 97 had had general anaesthesia, three had had sedation only, and four had had their operations cancelled. One patient was an emergency admission following a mild anaphylactic reaction to injected contrast media in the X-ray department. No patient receiving treatment under local anaesthetic alone was subsequently admitted. The majority of in-patient admissions were for less than 24 hours. The reasons for these admissions are shown in Table IV.

TABLE IV

Reasons for in-patient admission in 105 patients from the day care unit

Day case surgery inappropriate	*Surgical complications*	*Anaesthetic complications*	*Others*
18 (17%)	*48 (46%)*	*37 (35%)*	*2 (2%)*
2 > age 70 years	8 Haemorrhage	21 Nausea ± vomiting	1 Emergency collapse in X-ray after injected contrast media
1 No accompanying adult	3 Further investigation	13 Drowsiness ± dizziness	1 Transfer from medical ward
1 Obese	4 Extensive surgery	1 Difficult airway	
4 Severe respiratory distress*	4 Fractured malar	1 Caudal epidural injection	
2 Bleeding problems**	3 Excessive sedation	1 Epileptic	
1 Multiple sclerosis	8 Post-operative pain		
1 Hb. 6·8g/dl*	7 Elevation/ observation of limb		
1 Epileptic	2 Not voiding urine		
3 Hypertensive	2 Urinary catheter inserted		
1 Parkinson's disease	6 Theatre late		
1 Previous anaesthetic reaction	1 Physiotherapy required		

* = cancelled.

Eighteen patients (17%) did not fulfil the criteria for day care patients, mainly because of existing medical problems. Four patients in this group had their operation cancelled; one had a bleeding disorder, one was on warfarin, one was profoundly anaemic (haemoglobin 6·8g/dl) and one had an acute chest infection.

The largest group, 48 patients (46%), had surgical problems. Most of these were unforeseen surgical complications such as the insertion of a urinary catheter following cystodiathermy, haemorrhage, severe post-operative pain requiring further investigation, and the inability to void urine after circumcision. Other reasons for in-patient admission were to some extent avoidable, such as patients being called to theatre late in the afternoon, excessive sedation administered by the surgeon for diagnostic endoscopies and the need for elevation or observation of a limb. Four patients with fractured malar bones were admitted temporarily to the day ward due to the unavailability of more suitable accommodation, and one patient was transferred from a medical ward as a "day patient" for a minor gynaecological operation.

Thirty-seven patients (35%) had anaesthetic problems. Twenty-one suffered nausea and/or vomiting. The majority of these had received opiates, nine had been given nalbuphine, four levorphanol and one fentanyl. Seven patients had received cyclizine prophylactically. Thirteen patients were too 'drowsy' or 'dizzy' to be discharged safely. All of these had had opiates (eight long-acting and five short-acting — Table V). Of the three remaining patients, one required blind nasal intubation because of a difficult airway and was admitted following prolonged and

TABLE V

Post-anaesthetic sequelae

General anesthetic	*Nausea ± vomiting*	*Dizziness ± drowsiness*	*No anaesthetic problems*
Propofol, N_2O/O_2, halothane	6	—	34
Propofol, N_2O/O_2, isoflurane	—	—	1
Propofol, N_2O/O_2, halothane + fentanyl/alfentanil	1	5	3
Propofol, N_2O/O_2, halothane + nalbuphine	5	—	—
+ levorphanol	4	3	1
+ pethidine	—	2	1
Methohexitone, N_2O/O_2, halothane	1	—	10
+ nalbuphine	4	—	—
Methohexitone, N_2O/O_2, isoflurane	—	—	1
Thiopentone, N_2O/O_2, halothane	—	—	4
+ levorphanol	—	3	—
Thiopentone, N_2O/O_2, isoflurane	—	—	3

traumatic instrumentation of the larynx. The second patient, a 30-year-old woman, had an epileptic fit about two hours after a general anaesthetic with etomidate and alfentanil: she had denied having 'fits' on the pre-anaesthetic assessment form, despite a previous medical history of epilepsy and the diagnosis was confirmed later on electroencephalography. The third patient displayed loss of power in the legs and inability to void urine following a caudal epidural injection. This particular patient had completely recovered by the next morning.

DISCUSSION

In-patient admission represents a failure of the day care service and in this series amounted to approximately 5% of the throughput of the unit. Ogg[1] in Cambridge reported a hospital admission rate of 0·2% for the years 1984–1986 which seems remarkably low, and Goulbourne[2] reported an admission rate of between 3% and 5%, so there is great variation. The incidence of hospitalisation reported by Natof in the USA varied from 0·6% to 4·1%.[3] The reasons for admission in these studies were surgical, medical and anaesthetic-related, and were similar to the findings in this paper. Careful pre-operative assessment of patients at the out-patient clinics would reduce our in-patient admission rate considerably, and the use of a more stringent out-patient assessment form is being considered to improve patient selection. An anaesthetic assessment clinic, run in conjunction with the relevant surgical out-patient clinics would be another solution. There will always be a certain number of unforeseen acute problems which will result in either cancellation or in-patient admission.

The surgical problems (46%) reflect certain dilemmas inherent in the service. It is difficult to predict the individual patient's pain threshold. The pace of operating lists is variable and, as shown, six patients were admitted following surgery late in the afternoon. It is prudent to put the day cases first on lists, especially in the afternoon. A separate day care theatre would avoid this particular problem. With recent in-patient bed closures, there are often problems in finding beds for emergency cases (fractured malar bones, fractured limbs) which lead to admission to the day care unit as a temporary measure. Although this is not accepted practice, it allows more efficient use of theatre time. Orthopaedic, plastic or maxillofacial surgical patients are more likely to be admitted than those having general or gynaecological surgery performed. (Table III).

The post-anaesthetic sequelae causing admission were mainly nausea, vomiting, dizziness or drowsiness. Of the 21 cases suffering from nausea and vomiting, 14 had had opiates (13 long-acting) as had all the patients admitted with drowsiness/dizziness. Opioids are associated with respiratory depression, dizziness, nausea and vomiting.[4, 5] In addition, early mobility following anaesthetic predisposes to emetic side effects. Long-acting opioids are inappropriate for day care surgery and the use of simple analgesics or non-steroidal anti-inflammatory agents as pre-emptive analgesia reduces the post-operative analgesic needs.[6] A number of patients will require potent analgesics, and this is an area which needs further study in the day care setting.

Local anaesthesia is appropriate in many cases. Meridy[7] states that significantly fewer of these patients were admitted to hospital than those receiving general anaesthesia, and this has also been the case in this series.

Propofol is favoured by Millar[8] as it provided good conditions for day care surgery with superior recovery both immediately and 24 hours after operation. It has also been found to have anti-emetic properties;[9] the addition of alfentanil, a potent short-acting narcotic, did not increase the incidence of nausea and vomiting,[8, 10] and gave total patient satisfaction.[10] It may, however, be contraindicated in patients with a medical history of epilepsy.[11, 12, 13] It is also a more expensive drug than the alternative induction agents currently available. The response to McWilliam's study[14, 15, 16, 17] defends the use of propofol especially in day care surgery, drawing attention to the low relative cost of anaesthetic drugs compared to the cost of surgery, and pointing out that low post-operative morbidity is 'cost saving' by reducing the post-operative in-patient admission rate.

Interestingly, no patient given isoflurane, an inhalational agent in frequent use in this hospital, required in-patient admission with anaesthetic problems. Short[18] found that isoflurane-supplemented anaesthesia allowed recovery as rapidly as an alfentanil-supplemented group and demonstrated a low incidence of nausea and vomiting. Eger,[19] felt that isoflurane caused less nausea than halothane. Carter,[20] however, found that there was no real difference between isoflurane, halothane and enflurane for short procedures.

In summary, in-patient admission following day surgery procedures would be reduced by improved out-patient selection of cases by introducing a pre-admission assessment form filled in at the out-patient clinic, operating early on day cases or by using a separate day case theatre, and avoiding the use of the day care ward for the temporary accommodation of emergencies. Anaesthetic complications would be reduced by increased use of local anaesthetic techniques, reduction in the use of the longer-acting parenteral opioids, the use of oral analgesic or non-steroidal anti-inflammatory agents as premedicants and possibly a wider range of propofol and alfentanil as the anaesthetic technique of choice.

A prospective study is planned further to elucidate the sequelae of the various anaesthetic techniques used, with the aim of improving the day care service.

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A review of 100 consecutive Richard's total knee replacements

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SUMMARY

One hundred consecutive Richard's Maximum Contact (RMC) knee replacements were performed in Belfast between 1978 and 1982. Most of the 100 knees (86 patients) involved had been in severe pain, had marked stiffness or gross knee deformity, or were chairbound because of the knee. They were reviewed between five and eight and a half years (mean five years and eleven months) after operation. Thirteen patients (13 knees) died before review leaving eighty seven knees in 73 patients available for study. Using a modification of the British Orthopaedic Association knee function assessment chart, 26 knees (30%) were graded as excellent, 22 (25%) as good, 19 (22%) as fair and nine (10%) as poor. There were five implant failures, four the result of deep infection, one due to loosening. Six patients were chairbound at review and were also graded as failures. These results support the view that total knee replacement approaches the predictability and success of arthroplasty of the hip.

INTRODUCTION

The great success of total hip arthroplasty in the treatment of both degenerative and rheumatoid arthritis has led surgeons to seek, and patients to expect, similar results from replacement of the knee joint. It has been widely perceived that, compared with hip arthroplasty, knee replacement is less successful, and less predictable in its end result. Although some workers claim that knee arthroplasty is approaching that of the hip in terms of its reliability,[1] it may be some time yet before this becomes the generally accepted view.

The knee is a much more complex joint and there are a huge number of different implants in general use.[2] In 1972, Freeman and Swanson[3] introduced the concept of the total condylar knee which remains the most common implant design in current use.[4,5] A total condylar knee of the Richard's Maximum Contact (RMC) type[6] was first used in Belfast in 1978 and early experience was very encouraging.[7] To obtain a more valid and accurate assessment of this knee, we have retrospectively reviewed our first 100 arthroplasties.

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MATERIALS AND METHODS

Between November 1978 and April 1982, 100 Richard's RMC total knee replacements (Fig 1) were performed on 86 patients. There were 66 females and 20 males; the mean age at operation was 61 years (range 26–76). Fifty four patients had rheumatoid arthritis (30 having been treated with systemic steroids) and 32 patients had osteoarthritis. Twenty four knees had been subject to previous surgery — synovectomy, previous arthroplasty or meniscectomy. Three patients had undergone more than one previous operative procedure.

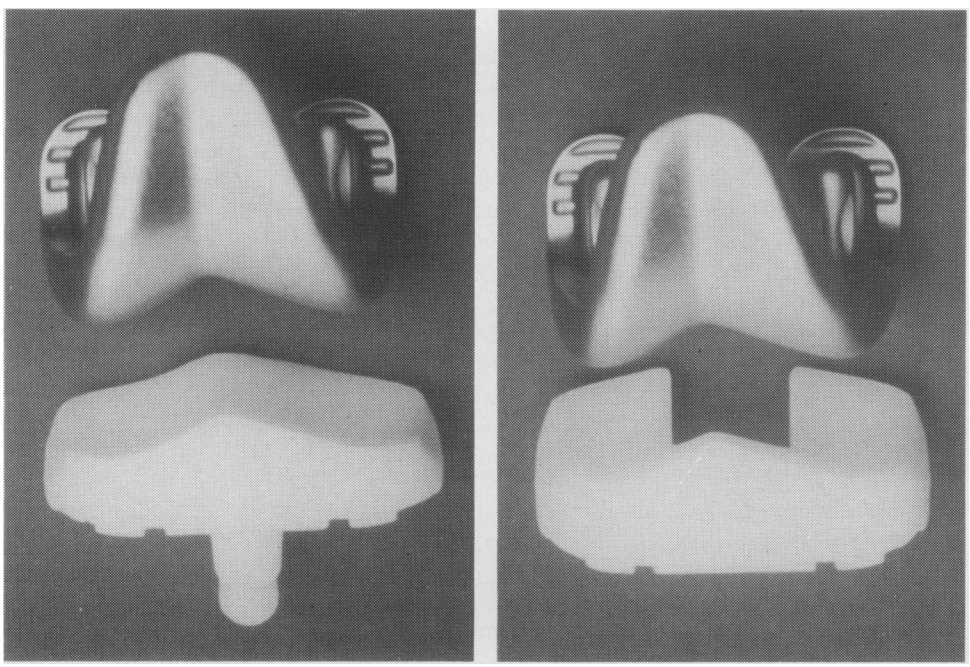

Fig 1. The Richard's Maximum Contact (RMC) knee prosthesis with cruciate sacrificing (left) and cruciate sparing (right) tibial components. The patellar component is not shown.

Of the 86 patients undergoing total knee replacements, 23 had had a contralateral knee replacement, nine had one total hip replacement and seven had bilateral total hip replacements. Four patients had already had three weight-bearing joints replaced at the time of operation. Severe pain was the primary indication for operation in 90% of cases. Stiffness, deformity and instability were other significant complaints, many patients having more than one symptom. Thirty one knees had a pre-operative flexion deformity of more than 20 degrees. In nine the pre-operative valgus deformity was in excess of 30 degrees, and in six knees there was a varus deformity greater than 20 degrees. Seventeen patients were chairbound prior to operation and a further 15 were confined indoors.

All operations were performed by a small number of surgeons of consultant grade. A curved medial parapatellar approach was utilised. The patellar articular surface was not routinely replaced. All wounds were closed with suction drainage and pressure dressings were applied. Initially mobilisation was not permitted until

the wound was soundly healed but with experience mobilisation was commenced from the third post-operative day after removal of the suction drains.

Seventy three patients (87 knees) were assessed at review by two of the authors (PJG, GFMcC) using a modification of the British Orthopaedic Association knee function assessment chart.[8] Anteroposterior (taken standing) and lateral radiographs were taken at review except in those who could not attend hospital; they were visited and assessed in their own homes. A full assessment was made of pain, walking distance and use of a walking aid, gait, flexion deformity and range, valgus or varus deformity and ability to get up from a chair or to climb stairs, and a score was allocated to each modality. Pain was scored as four when severe, three when moderate, two when slight or occasional and one when absent. Thus the better the result the lower the pain score. The overall result was graded from one to five by the reviewing authors together, corresponding to excellent, good, fair, poor and failure.

A result was graded as excellent when the operation had achieved complete or almost complete relief of pain, ability to flex the knee to a right angle, correction of deformity and considerable improvement in mobility, especially in terms of walking distance. In addition, for a result to be graded as excellent, the radiographs had to show both implants correctly positioned and absence of a lucent line at the bone-cement interface (Fig 2).

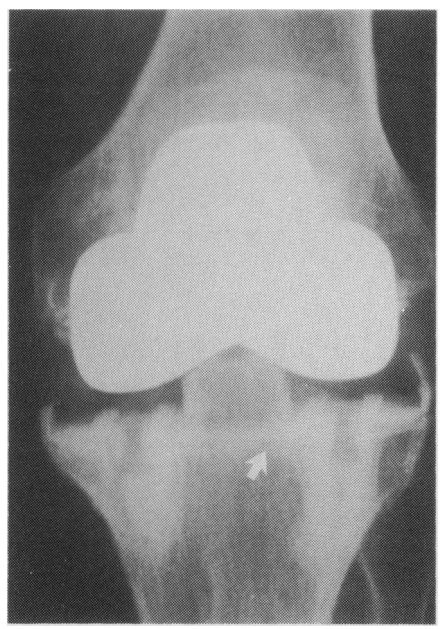

Fig 2. An obvious lucent line is present at the tibial bone-cement interface (arrow). The patient had symptoms suggestive of loosening and the result was graded accordingly poor.

A good result denoted mild residual pain, incomplete correction of deformity, or failure significantly to improve preoperative flexion and walking range. In knees in which two of these features were present at review, or where one was present to a moderate degree, a fair grading was awarded. An implant was deemed to have failed if it had to be removed, or if it had become so loose as to be functionally unstable. The medical condition of a number of patients was such that after an initial improvement, their walking deteriorated to the extent that they eventually had no useful mobility. These patients were assessed as being functional failures and graded accordingly. Finally, the patients themselves were also asked to grade their operation and to comment on whether they would, if indicated, have a further knee replacement.

RESULTS

Thirteen patients (13 knees) had died prior to review, three of these never having been discharged from hospital following operation. One of these patients

died 15 days post-operatively from adrenal failure and must be considered a peri-operative death, the only one in the series. The two others developed medical complications in the rehabilitation period which prevented their discharge from hospital; they died seven months, and two years and four months respectively, after operation. According to information supplied by their family doctors, death in the other ten cases was not related to surgery and, so far as could be determined, there had been a satisfactory result from knee replacement. The four prostheses which had to be removed were not reviewed, but were automatically graded as failures. Thus, in total, 87 knees were graded.

The most significant improvement reported by patients was pain relief (Fig 3). Ninety percent of patients had had severe knee pain pre-operatively. At post-operative assessment, 34 knees (41% of those reviewed) had no pain whatsoever, while a further 35 knees (42%) admitted to only mild pain or occasional discomfort. In 13 of the 35 cases with mild pain, symptoms were confined to the patella. Five of the 11 patients (11 knees) who continued to complain of moderate pain had symptoms confined to the patella, a feature also noted in two of the three knees with severe pain post-operatively. Four knees had been surgically revised and were therefore not included in this pain assessment.

Assessment of improvement in mobility, especially walking distance (Fig 4), proved rather more difficult. Many subjects had symptoms in other weight-

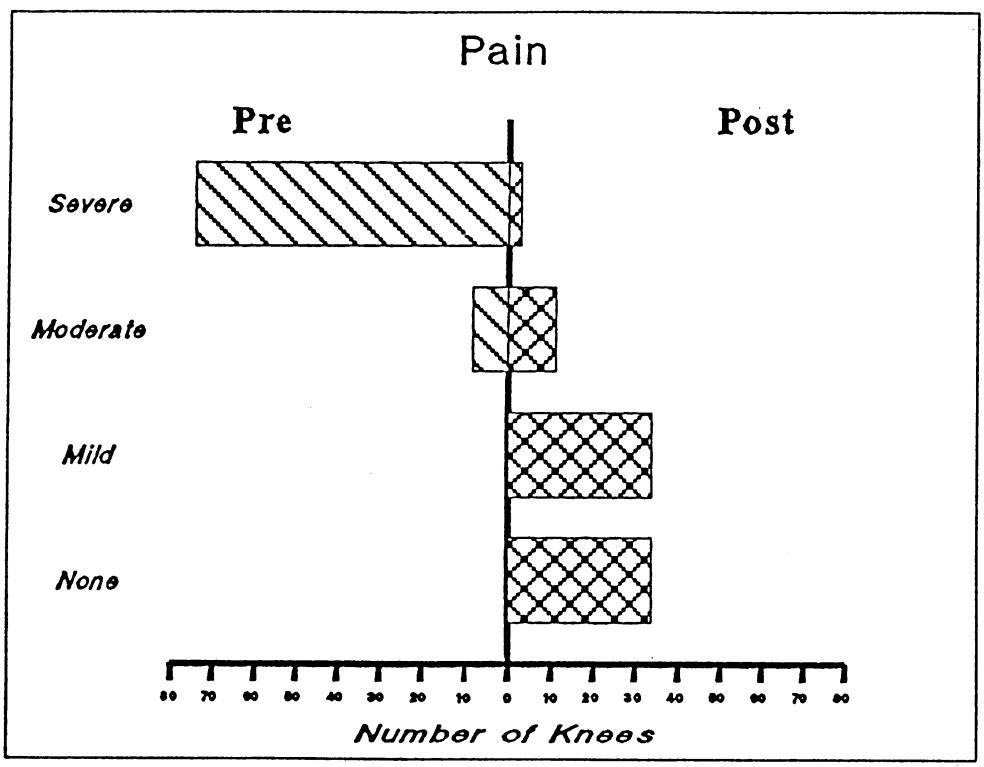

Fig 3. Bar chart showing the number of knees in each of the four pain categories pre-operatively and post-operatively. There was a marked improvement in pain after operation.

bearing joints. especially in the ankle and foot, but improvement in mobility was reported by the majority. Only three patients had been able to walk an unlimited distance pre-operatively but 15 reported no limitation of walking ability at post-operative assessment, and a further 11 could walk up to one kilometre outdoors.

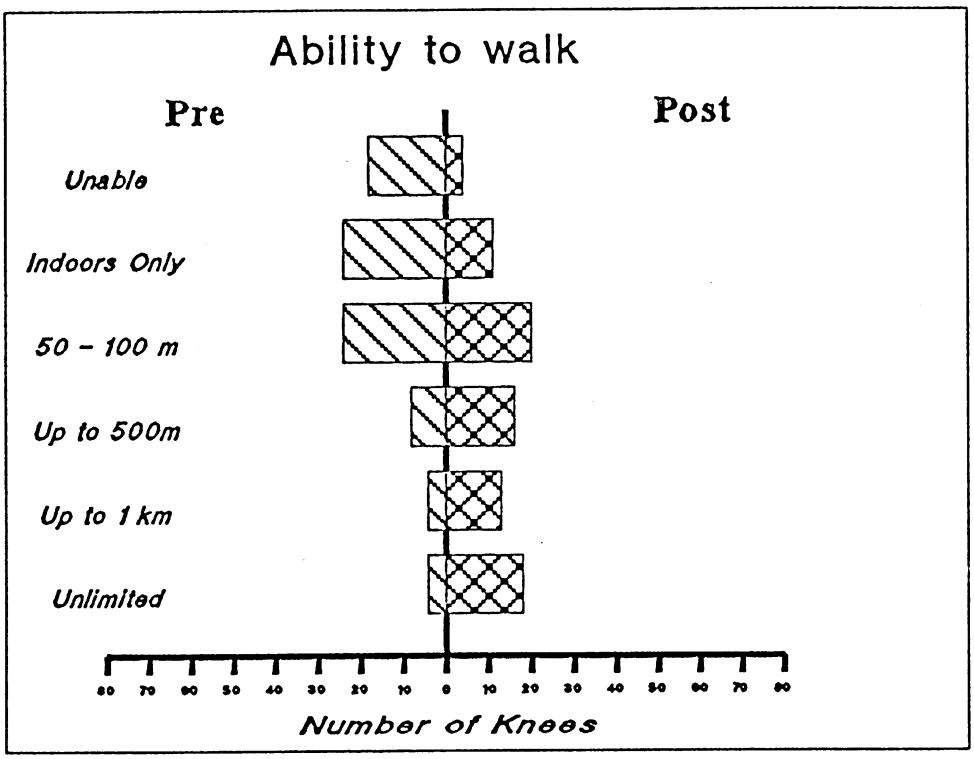

Fig 4. Bar chart showing maximum walking distance for each patient per knee replacement pre-operatively and post-operatively. There was a shift towards a greater walking distance post-operatively.

Improvement in the flexion range was reported by most patients at review (Fig 5). Thirty eight knees (46% of those reviewed) had flexion to above 80 degrees pre-operatively, which rose to 48 knees (58%) at review. Flexion deformity was generally improved by operation (Fig 6). Pre-operatively 32 knees (38%) had a flexion deformity in excess of 20 degrees; at post-operative assessment only 5 knees (6%) had this degree of deformity.

Based on the grading system previously described, 26 knees (30%) were graded as excellent, 22 (25%) as good, 19 (22%) as fair and nine (10%) as poor. There were 11 failures. Knees were graded as fair, generally on the basis of continued moderate pain, or limited — though improved — flexion and extension. Of the nine knees graded as poor three had continuing severe pain, four recurrence of the original deformity (two varus, two valgus) and two failed to regain the pre-operative flexion/extension range.

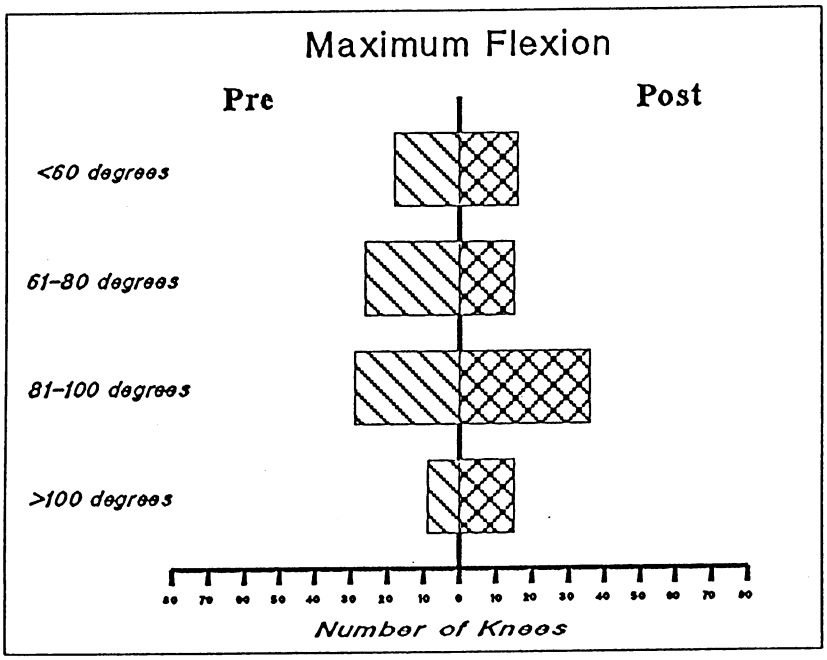

Fig 5. Bar chart showing the maximum flexion of each knee before and after replacement. Most patients reported an increase in flexion ability though the improvement in this parameter was not as obvious as in others.

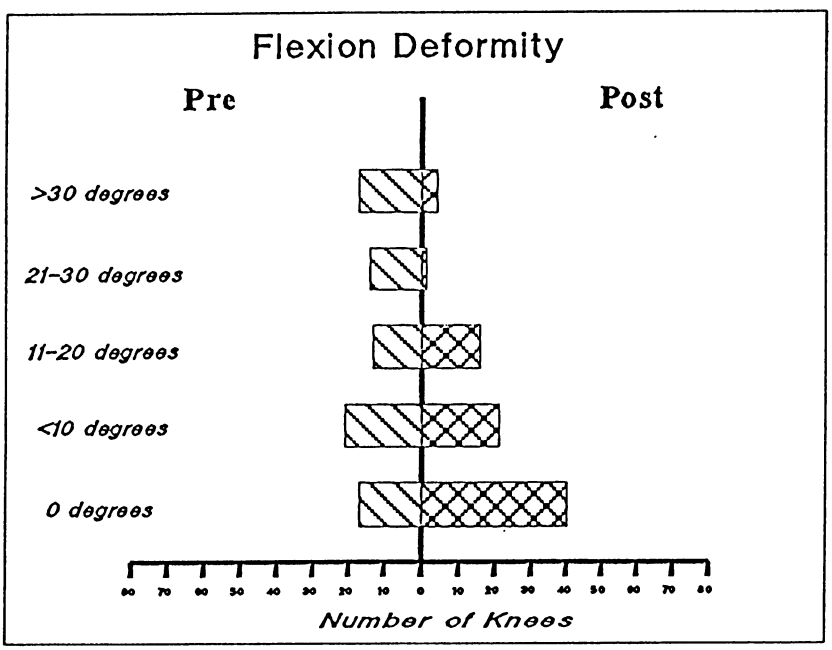

Fig 6. Bar chart showing the flexion deformity of each knee before and after replacement. There was considerable reduction in deformity after surgery.

There were five implant failures (6%), four the result of deep infection, the fifth due to loss of fixation as a result of a fall (Fig 7). In three of the infected implants, the pre-operative diagnosis was osteoarthritis. The interval to failure in these cases was seven, 49, 66, 69 and 78 months. Two of the four infected implants were successfully arthrodesed and two were exchanged. One of the exchanges was performed within the period of the survey and the end result was good. Mobility deteriorated in six patients (6 knees) following an initial improvement post-operatively for a variety of medical reasons such that, at review, they were chairbound and unable to walk. In these patients, the operation was considered to be a functional failure and graded accordingly. Three of these patients had suffered a cerebrovascular accident in the interim and had regained no useful mobility thereafter. In one patient with aggressive rheumatoid disease, the knee had become virtually ankylosed and the patient chairbound. A further patient had had a below knee amputation as a result of peripheral vascular disease, while the sixth patient never walked independently post-operatively due to a combination of gross obesity and poor motivation.

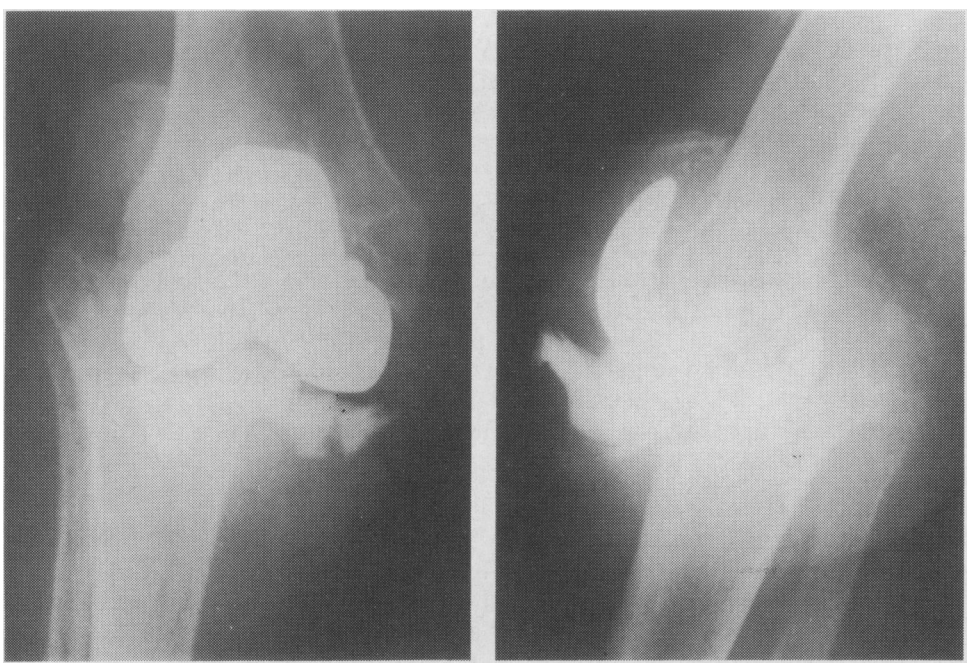

Fig 7. Failure of fixation as a result of a fall 78 months from arthroplasty. The patient was independently mobile using a knee brace and declined further surgery.

Post-operative complications were relatively few. Nine knees required manipulation under anaesthetic, two requiring more than one manipulation. There were three proven cases of deep venous thrombosis. In four knees there was a considerable delay in wound healing, while another required wound resuture. None of these cases subsequently became infected. One patient had persistent patellar subluxation and had a realignment procedure performed at two years

later. A further patient suffered a foot drop, but this had recovered six months after operation.

Patients' assessment of the operation was generally more favourable than that recorded by the clinical observers. On average, patients assessed their result one grade better than the authors. Thus, 42 knees (48% of the knees graded) considered their result to be excellent and a further 28 (32%) considered their result to be good. Eighty two percent of patients reviewed stated that, given similar symptoms, they would consider further knee arthroplasty.

DISCUSSION

In assessing the results of total knee arthroplasty, unfair comparison is often made with total hip replacement, especially in the mind of patients undergoing operation. Nevertheless, sufficient evidence now exists to propose total knee arthroplasty as a relatively safe and reliable form of treatment for rheumatoid and degenerative diseases of the knee.[1,5,9,10] Our own experience with these first 100 Richard's knee replacements, and with more than 500 arthroplasties of the same type which have been performed subsequently, would support this view.

Analysis of the medium term results of our first 100 Richard's knees have led to some modifications in terms of patient selection and our operative and post-operative management. Careful patient selection is most important. The grossly overweight patient, aggressive rheumatoid disease and poor motivation are factors which mitigate against a good outcome from knee arthroplasty.[5] Pre-operative compliance with dietary restriction and physiotherapy is a good indicator of motivation.

We had initially reserved total knee replacement for those in the older age-groups with advanced disease, in accordance with the caution urged by Waugh.[2] Thus in the first 100 cases there was a high proportion of patients who were either chairbound, or who had marked stiffness and gross deformity. Set against this, our results, with 55% excellent or good and 22% fair (improved) on a more than five year follow-up, are very encouraging. Our practice now is to operate earlier, before the onset of significant fixed deformity, with the expectation of better post-operative stability and mobility.

As an operation directed in large part towards the relief of pain, total knee replacement must be considered a success. In our series, 82% of patients reviewed had no pain, or only slight, occasional discomfort post-operatively. In more than one third of those with slight pain, symptoms were confined to the patella. In those with more significant post-operative pain, patellar symptoms were predominant. Some of those patients with more severe symptoms undoubtedly had some degree of patellar maltracking. Similar patellar symptoms following total knee replacement have been reported by others especially in relation to knees with a valgus deformity.[11,12] More serious patellar problems, such as subluxation and dislocation, or fracture after prosthetic replacement, are reported to be relatively uncommon.[13] In our series only one knee required post-operative realignment of the patella, and there were no cases of patellar dislocation or fracture. We now perform a lateral release in a significant percentage of knee replacements, and patellar problems have become less frequent.

In five knees there was either significant delay in wound healing or wound breakdown. Fortunately none of the cases with wound problems subsequently became infected. Great care should be taken in the handling of soft tissues around the knee as healing properties are often impaired. As a result of wound problems, we now prefer to use a median or straight parapatellar incision rather than the curved medial incision formerly used. Analysis of the four knees which became infected revealed no common or underlying factor. Rather surprisingly, three of the four infections occurred in knees in which the pre-operative diagnosis was osteoarthritis. Certainly with rheumatoid patients on systemic steroids there is a high index of suspicion of underlying asymptomatic infection. Swabs sent for culture at the time of operation have occasionally been reported as positive for staphylococci, and it is now our policy to send swabs routinely in every case. Where the culture is reported as positive, the prophylactic antibiotic regime is extended to a therapeutic course.

When judged against the excellent results which we achieved in pain relief, the flexion/extension range observed at review was somewhat disappointing. Although the majority of cases were improved, the average post-operative range of movement was less than that reported by others.[5, 14] This was undoubtedly due, in large part, to our initial conservatism in not permitting knee bending until the wound was soundly healed. Thus flexion was not permitted for two to three weeks after operation. We now routinely permit mobilisation from the third post-operative day and — depending on availability — patients are often placed on a continuous passive motion machine in the recovery room immediately after surgery. The use of such machines following knee replacement is gaining widespread acceptance.[15]

Total replacement of the knee is now established as the treatment of choice in advanced degenerative and rheumatoid disease. The risks of surgery are no greater than those for hip replacement, and the outcome is almost as predictable. The growing numbers of patients requesting arthroplasty of the knee is testimony to its increasing acceptability and success.

The surgery on the patients in this study was performed by Mr N McLeod, Mr J Lowry, Mr J R Nixon, Mr J Templeton, Mr C J McClelland, and Prof R A B Mollan. We wish to thank our colleagues for permission to study their patients.

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The surgical management of familial adenomatous polyposis in Northern Ireland

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SUMMARY

Sixty-eight patients from 18 families have been identified as having familial adenomatous polyposis during the past 30 years in Northern Ireland (population 1·5 million). Six of the 18 probands (33%) had developed colonic carcinoma when first seen at mean age 34 years. Ten of the 44 patients identified by surgical screening (21%) at a significantly lower mean age of 23 years had colonic carcinoma. Surgical management has generally been by subtotal colectomy with ileorectal anastomosis, or by panproctocolectomy and ileostomy.

INTRODUCTION

Familial adenomatous polyposis (previously termed familial polyposis coli), is an autosomal dominant condition characterised by the development of more than 100 adenomatous polyps in the large bowel.[1] It is associated with numerous extracolonic manifestations including osteomas, epidermoid cysts, desmoid tumours, retinal lesions, gastroduodenal polyps and adenocarcinomas, and dental anomalies. If untreated, carcinomatous changes inevitably develop in one or more of the colorectal polyps.[2] The recognition of the inherited nature of this condition has permitted an effective screening programme which can reduce the incidence of carcinoma when combined with appropriate surgery. We present a review of the surgical management of patients with familial adenomatous polyposis and of those members of their families at risk.

PATIENTS AND MATERIAL

In Northern Ireland, a total of 68 patients from 18 families have undergone surgical procedures for familial adenomatous polyposis in the past 30 years. Operative details were verified from hospital records, and, where this was not possible, by discussion with the patient or next of kin. Information was available on sixty-five of these patients.

RESULTS

Age at diagnosis was available on the 18 probands (the first member of each family to be diagnosed). The median age was 34 years (range 8 – 55 years).

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From the 18 families, 47 relatives were detected by screening, median age 23 years (range 8–43). The difference between the two groups was significant (Mann-Whitney U test: $p = 0{\cdot}008$). (Table).

TABLE

Median age, range and incidence of carcinoma in probands and patients identified by screening

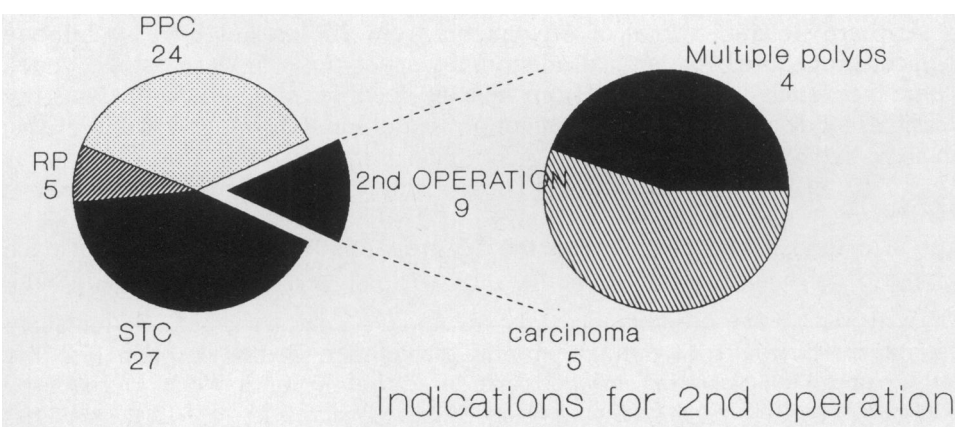
	Median age at diagnosis	*Range*	*Incidence of carcinoma*
Probands (N = 18)	34	8–55	33%
Screened (N = 47)	23	8–43	21%

A carcinoma was present in six of 18 probands when first seen and in ten of 44 patients identified by screening. This difference was not significant ($X^2 = {\cdot}75$, 1df, $p = 0{\cdot}4$). Interestingly, three patients in the screened group had been seen on one occasion before age 20 years by a medical practitioner, and because no polyps were noted, were reassured and discharged. One of these became symptomatic with multiple polyps and a carcinoma some 15 years later, and two of this patient's siblings also were shown to have carcinomas. Only one child of an affected individual had a carcinoma, out of 29 found to have polyps on screening. When compared with the probands, the difference in incidence of carcinoma was significant ($X^2 = 7{\cdot}826$, 1df, $p = 0{\cdot}05$).

Thirty-six patients were treated by subtotal colectomy and ileorectal anastomosis, nine of whom subsequently required abdominoperineal excision of the rectum. (Figure). The indication for excision of the rectum in five patients was carcinomatous changes in the rectal segment, and in four extensive 'carpeting' with

FIGURE

Surgical procedures for familial adenomatous polyposis



PPC = Panproctocolectomy. RP = Restorative proctocolectomy.
STC = Subtotal colectomy/ileorectal anastomosis.

polyps. The mean period of follow-up to malignant transformation was 12 years. In this group two patients died from metastatic disease within two years of diagnosis of their rectal tumour. The remaining three patients are alive and well two to ten years after rectal excision. The median age for probands treated by colectomy and ileorectal anastomosis was 35 years (range 11–54 years). For those detected by screening and treated in this manner the median age was 19 years (range 8–37 years).

Twenty-four patients were treated by panproctocolectomy and ileostomy formation, of whom fifteen had a carcinoma at time of presentation. Nine patients had multiple polyps but no evidence of malignancy. The mean age at time of diagnosis for the probands was 39 years (range 24–55 years) and for those screened 31 years (range 16–42 years). Five patients have been treated by restorative proctocolectomy, median age at diagnosis 25 years (range 17–40 years). Five patients have undergone a variety of surgical procedures including colectomy, laparotomy alone (when carcinomatosis was found) and fulguration.

DISCUSSION

The first description of familial adenomatous polyposis is attributed to Harrison Cripps in 1882.[3] For many years the surgical treatment was restricted to local excision of large polyps which could be removed *per rectum,* or to palliative procedures for patients who had developed carcinoma. Colectomy for the control of established disease was not considered until after 1925, but was associated with an extremely high post-operative mortality, figures of 25% being quoted for abdominoperineal excision of the rectum and 50% for colectomy.[4] More recent overall figures for the morbidity and mortality associated with large bowel resection for malignant disease have been estimated to be approximately 9% and 13% respectively.[5] It is clear that the morbidity and mortality associated with ileorectal anastomosis performed as an elective procedure in a young fit population would be significantly lower. In our own practice, operative mortality for elective colonic surgery in this age group is virtually zero, and wound and intraperitoneal sepsis have occurred in less than 2% of cases.

In 1939 McKinney described panproctocolectomy with ileostomy formation, or, as an alternative, subtotal colectomy and ileosigmoid anastomosis, with follow-up fulguration of polyps.[6] In 1957 Hubbard noted regression of rectal polyps after subtotal colectomy and ileorectal anastomosis, an observation which helped to popularise this operation.[7] The ideal procedure should remove all large bowel mucosa yet preserve normal or near normal bowel function, and thus avoid a stoma. The operation should have an acceptable level of morbidity and preserve normal sexual function.[6]

At present there are three options available to the surgeon: i) panproctocolectomy with ileostomy, ii) subtotal colectomy and ileorectal anastomosis, and iii) restorative proctocolectomy. No single procedure is suitable for every patient. The desires of the patient, the preference of the surgeon and the proposed follow-up must all be considered before a decision is reached. Panproctocolectomy with Brooke ileostomy has the advantage of being a straightforward procedure, with a relatively low perioperative complication rate. In those presenting with a carcinoma in the middle or lower rectum it is the operation of

choice, and may be considered the best option in the elderly or debilitated patient.[10] The disadvantages of this operation include cosmetic and psychological problems associated with the stoma, and the risk of sexual or bladder dysfunction if a close rectal dissection has not been undertaken. In addition, there are a number of complications associated with ileostomy formation including skin irritation, retraction, prolapse, and parastomal hernia. Panproctocolectomy removes the entire colonic mucosa with its malignant potential. In the past this was considered a curative procedure with routine follow-up being unnecessary, but the recognition of upper gastrointestinal polyps, and malignancy in duodenal polyps, has highlighted the need for long-term review.[9,11] The reported incidence of upper gastrointestinal polyps ranges from 24–100% in patients affected by familial adenomatous polyposis, and there are no clear guidelines on management.[9,12]

The risk of malignancy developing in the duodenum of patients with familial adenomatous polyposis is 50–100 fold greater than that of the general population; however, the risk is still small. At present surgeons are reluctant to recommend a Whipple's procedure without evidence of frank malignancy, but it is advisable to perform regular upper gastrointestinal endoscopy and biopsy of polyps. Large polyps may be removed by snaring or fulgurated as in the rectum, but clearance of all duodenal polyps is seldom feasible.

Ileorectal anastomosis has been the most popular operation in this condition. The operation is safe and the sphincters and the pelvic autonomic nerve plexuses remain intact. Following colectomy and ileorectal anastomosis it is necessary to deal with the largest rectal polyps by fulguration or snaring, and the patient must attend for regular follow-up with proctosigmoidoscopy. Polyps of 5 mm or more should be removed or fulgurated, but it is unnecessary and indeed may be inadvisable to remove all minute polyps. Repeated fulguration of the rectum can lead to extensive scarring of the rectal mucosa, so that early malignant transformation may be difficult to recognise. Follow-up examination is performed every six to 12 months, and polypectomy is required on average every two to three years.[13] The long-term risk of malignant transformation in the rectal remnant varies greatly, from as low as 13% in the St Mark's series to as high as 59% in the Mayo Clinic series.[14,15] Where numerous polyps exist or where they form almost a complete 'carpet' in the rectum, rectal excision should be considered. Even if the patient attends regularly for follow-up there is no guarantee of protection from carcinoma formation. Indeed we report two cases where tumours developed in spite of regular follow-up.

The risks of rectal cancer must be considered by both surgeon and patient when deciding on the operation to be performed. The ileorectal anastomosis ensures good bowel function, has a low complication rate and simple follow-up, but patient compliance is vitally important. The importance of this follow-up must be impressed on the patient, and if there is a possibility that the patient would be unco-operative another procedure should be considered. We advise combined upper and lower gastrointestinal flexible endoscopy at a single visit on an annual basis in established disease involving upper and lower gastrointestinal tracts, with a rigid sigmoidoscopy once in the interval. If no upper gastrointestinal manifestations are present then oesophagogastroduodenoscopy every three years is probably adequate.

Restorative proctocolectomy with pouch formation and ileoanal anastomosis appears to be closest to the ideal surgical procedure for patients with familial adenomatous polyposis. In this operation, all colonic mucosa is removed, near-normal bowel function can be preserved with avoidance of stoma formation, sexual function is preserved and in specialist units the complication rate is low.[16] Complications nevertheless are more frequent than with other pelvic resections, especially pelvic sepsis. In 5–6% of cases the procedure fails, and a permanent ileostomy is needed. A defunctioning ileostomy is required until the ileoanal anastomosis has healed. "Pouchitis" has now been recorded in cases of restorative proctocolectomy.[17] Unfortunately frequency of defaecation and anal leakage may mar the results of surgery and this operation cannot therefore be considered the procedure of choice in most cases.

The advantages of screening the offspring of these patients are reflected in the reduced incidence of carcinoma at time of diagnosis. To identify those at risk it is necessary to have accurate pedigrees. Those at risk can be advised to attend for screening. The use of a polyposis register has been shown to reduce the incidence of carcinoma in those carrying the gene for familial adenomatous polyposis.[18, 19] As part of ongoing research into gene markers of this condition we have been collecting information on families.

We would like to thank the following surgeons who kindly provided information on patients under their care: Mr H Logan, Mr S T D McKelvey, Ulster Hospital, Dundonald; Mr T K Day, Mr K Panesar, Altnagelvin Area Hospital, Londonderry; Mr B Dane, Coleraine Hospital; Mr W Graham, Craigavon Area Hospital; Mr A Wilkinson, Mr C Russell and Professor B J Rowlands, Royal Victoria Hospital, Belfast. Mr R J Maxwell, Royal Victoria Hospital, has performed all of the restorative proctocolectomies carried out to date.

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Diabetes care by general practitioners in Northern Ireland: present state and future trends

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SUMMARY

A questionnaire returned by 250 (71·4%) of the 350 general practices in Northern Ireland indicated that although only 34 practices had special arrangements for seeing their diabetic patients, 178 practices stated that they would like to be more involved in the care of their non-insulin-dependent diabetes mellitus (NIDDM) patients. One hundred and eight practices felt the same way about their insulin-dependent diabetes mellitus (IDDM) patients. One hundred practices stated that the partners felt competent to manage their diabetic patients. The main area where general practitioners felt they needed to improve their knowledge was ophthalmology (56 practices). When asked which type of care scheme would appeal most to their practice, 135 practices stated that regular attendance with the general practitioner and annual hospital review would be the preferred arrangement. Overall there was a positive attitude towards increased general practitioner involvement in diabetes care.

INTRODUCTION

In recent years there has been considerable debate about the role of the general practitioner in the management of diabetes.[1] Since 1972 the Royal College of General Practitioners has been encouraging general practitioners to become more involved in the routine care of patients with chronic disease. The College has produced a Diabetes Folder which gives clear guidelines on the care of patients and strongly advocates the concept of structured care.[2]

Day et al[3] showed that for general practitioners to take on even routine diabetic care they need to be well organised and have a structured approach. They also need sufficient community services and resources to provide a standard of care which will complement that of their hospital colleagues. Although diabetic clinics

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in general practice can be successful and provide a good standard of care,[4] there have been occasions where clinics have run into problems.[5] Smaller practices may find clinics less appealing or viable but Foulkes et al[6] have shown that a successful structured approach can be adopted in the normal consultation.

For various reasons there is considerable regional variation in the services available for patients with diabetes in the United Kingdom.[7] In Northern Ireland traditionally there has been an excellent hospital-based diabetic service. The main aims of this study were to assess the existing provision of diabetic care within general practice in Northern Ireland, to assess the level of primary health care team resources, and to determine general practitioners' attitudes towards increased practice involvement in the care of their diabetic patients.

METHOD

In September 1989 a questionnaire was sent to one general practitioner in each of the 350 general practices in Northern Ireland as identified by the Central Services Agency (FPC equivalent in Northern Ireland). This covered the entire population of Northern Ireland (approximately 1·5 million). The questionnaire was worded to encourage practice-based responses rather than an individual opinion. The questionnaire was divided into three main sections: practice description and personnel, practice attitude to diabetes care and quantitative information.

An accompanying letter outlining the aims of the questionnaire was sent to each practice. It recognised that it might not be possible for some practices to complete the questionnaire fully but all practices were asked to return the questionnaire even if incomplete. The questionnaire was anonymous, but practices were given the opportunity to identify themselves if they required further contact with a general practitioner and nurse appointed by the Royal College of General Practitioners as diabetic facilitators. One reminder letter was sent out to practices who did not reply to the first communication.

RESULTS

A total of 250 questionnaires were returned (71·4% response). There were no marked differences in the characteristics of the practices that did not respond when compared to those that did. Of the 250 questionnaires returned 173 were fully completed in every respect, 57 were incompletely answered and 20 were considered invalid. Analyses were conducted on the 230 (65·7%) questionnaires.

Table I shows the level of diabetic care existing in the practices. Practices where one or more partners have a particular interest in diabetes were significantly more likely (Chi squared $p = 0·001$) to have special arrangements in the practice for seeing diabetic patients. This was not the case for practices who said they would like to be more involved in the care of diabetic patients on diet/tablets ($p = 0·3$) or for practices who thought that the care of diabetic patients on diet/tablets should be based more in general practice than in hospital ($p = 0·7$). Practices which indicated that they would like to be more involved in the care of their NIDDM patients were no more likely to have readily available advice from either a dietitian ($p = 0·2$) or a chiropodist ($p = 0·2$).

TABLE I

*Exisitng diabetic care**

	Yes (%)	*No (%)*	*Total*
Does the practice have any special arrangements for seeing diabetic patients?	34 (15)	194 (85)	228
Resources based in the practice or easily available:			
Dietitian	157 (71)	65 (29)	222
Chiropodist	131 (61)	85 (39)	216
Nurse with interest in diabetes	67 (30)	158 (70)	225
Partner with interest in diabetes	67 (30)	158 (70)	225
Data provided by practice computer	16 (7)	200 (93)	216
Audit of diabetic patients	26 (11)	201 (89)	227
Diabetic Care Card currently used	32 (14)	195 (86)	227

*The denominator shown under "Total" is the number of practices who answered the question (this will not always be 230).

The views of individual practices on their own diabetic skills are shown in Table II. Practices where partners felt their skills were adequate to manage their diabetic patients were significantly more likely to want to be more involved in the care of their IDDM patients ($p = 0{\cdot}05$).

TABLE II

Practice skills

	Yes (%)	*No (%)*	*Unsure (%)*	*Total*
Do the partners feel competent to manage their diabetic patients?	100 (48)	44 (21)	63 (30)	207

	Yes	(%)
Main areas where partners would like to improve their knowledge:		
None	93	(45)
Ophthalmology	56	(27)
Regular update of all management areas	17	(8)
Knowledge of insulin	16	(8)
Diet	9	(4)
Blood glucose monitoring	6	(3)
Total	207	

Views on changes in practice involvement in diabetic care and various care schemes are shown in Table III. One hundred and eighty practices (79%) felt the care of NIDDM patients should be based more in general practice and 178 practices (80%) wished to be more involved in their routine care. Interestingly,

although 108 practices (48%) wanted more involvement in the care of their IDDM patients, only 53 (23%) felt the care of IDDM should be based more in general practice. This would confirm the belief that increased involvement in diabetic care in general practice should be mainly for NIDDM, but increased involvement with IDDM patients should not be precluded when practices feel their skills are adequate. Sixty seven practices had a partner interested in diabetes, but only 23 of these had any special arrangements for seeing their diabetic patients. This would suggest that many more practices already have the expertise necessary to improve the care of their patients with diabetes. Thorn et al[8] point out that to run a successful mini clinic at least one of the partners must be interested in diabetes.

TABLE III

Changes in care of diabetes

	Yes (%)	*No (%)*	*Unsure (%)*	*Total*
Should diabetes care be based more in general practice for:				
(i) IDDM	53 (23)	112 (49)	62 (27)	227
(ii) NIDDM	180 (79)	28 (12)	19 (8)	227
Would your practice like to be more involved in diabetes care for:				
(i) IDDM	108 (48)	68 (30)	49 (22)	225
(ii) NIDDM	178 (80)	24 (11)	21 (9)	223

Which care scheme appeals most to your practice?	Yes	(%)
(i) Attend GP regularly with annual hospital review	135	(61)
(ii) Attend GP regularly with hospital review only at request of GP	57	(26)
(iii) Attend GP regularly with hospital doctor visiting practice	29	(13)
Total	221	

IDDM — Insulin-dependent diabetes mellitus.
NIDDM — Non-insulin-dependent diabetes mellitus.

For non-insulin-dependent diabetic patients the majority of practices saw general practitioner follow-up with annual review at hospital as the preferred shared care format. However, there will be situations where it is preferable for certain patients to be seen at hospital for the majority of their care. Only 29 practices (13%) wanted a hospital doctor to visit the practice for a joint review of diabetic care. The new arrangements for the Post Graduate Educational Allowance encourage general practitioners to organise meetings within their practices involving local hospital colleagues. Hopefully this improved liaison will result in better care of chronic illness.

DISCUSSION

Good diabetic care can only be provided by general practitioners if the community dietetic and chiropody services are easily available. Our results in this area were unexpected. One hundred and fifty seven practices (71%) had dietitians and 131 practices (61%) chiropodists readily available. However, subsequent visits by the facilitators have shown that although these facilities were considered to be easily available by the practices, very few had either available actually on the premises. We feel that to provide an adequate standard of care for diabetics it is essential that such resources are close to hand when required. This has important financial implications; with the current expansion of community care this may now be an appropriate time for practices to make the local health authority aware of their increasing needs. Sixty seven practices (30%) had a nurse with an interest in diabetes. We feel that the nurse has a major role to play in the development of diabetic care in general practice and in particular in the education of the diabetic patient. It is important for these nurses to be given the opportunity to attend appropriate courses on diabetic care.

It was not surprising to see ophthalmology identified as being the area that general practitioners wanted most to improve. Routine fundoscopy through dilated pupils should be carried out annually as retinopathy is a serious and common complication of diabetes. Increasing the number of adequately trained general practitioners would help ease this burden on the hospital clinics. The Mobile Eye Camera, recently introduced by the British Diabetic Association, may also have a role to play. However, it is also important to remember that good blood glucose control has been shown to reduce the incidence of diabetic retinopathy.[9]

The existence of an up-to-date disease register and accurate recording of routine patient data is essential if general practice audit on management of chronic diseases is to be undertaken. Only 26 practices (12%) said they carried out any form of audit on their diabetic patients. Simple audit provides an ideal starting point to identify areas which can be improved. Identification of *all* diabetic patients is fundamental. Studies report that up to 20% of diabetics do not attend anyone.[10] The general practitioner is in the position of being able to identify and hopefully to follow up this neglected group. Only 16 practices (7%) reported that their numerical results were obtained from a computer. Following the implementation of the new contract for general practitioners on the 1st April 1990 there has been a rapid increase in computerisation and 150 practices in Northern Ireland (43%) now have a practice computer. This has exciting implications for both the identification and management of diabetes. As problem lists are transferred onto computer, the identification of diabetics will become much easier and computerised recall will enable general practitioners to identify non-attenders.

One hundred and thirty six practices identified themselves at the end of the questionnaire as being interested in further contact. This has resulted in visits to 65 practices by the facilitators who have also met with a further 60 practices at several study days. The overall impression is that the majority of practices in Northern Ireland would like to take on more of the routine care of their NIDDM patients, but would need to improve their practical skills and organisation before being able to do so. There are various areas which are crucial to achieving this improvement and thus raising the standard of diabetic care in general practice.

These include accurate identification of all patients, agreement on a management protocol, regular audit and an efficient recall system. A general practitioner cannot manage all this in isolation. The back up of a properly trained practice nurse and the availability of a dietician and chiropodist greatly enhances the standard of care that can be offered. In addition, the use of a shared care card facilitates effective communication between the patient, the general practitioner and the hospital.

We are grateful to the Central Services Agency, Adelaide Street, Belfast for their help with this project and to Mrs Elizabeth McClure and Miss Anne Wilkie for their clerical assistance. Since this questionnaire Dr Colin Hegan and Sister Patricia Herron have been appointed as diabetic facilitators for the Royal College of General Practitioners NI Faculty, based in the Department of General Practice, The Queen's University of Belfast, funded by Eli Lilly & Co Ltd.

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Historical Review

Robert Campbell in Queen Street, 1897 – 1920. — Day surgery in the Belfast Hospital for Sick Children

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In a manuscript found among the papers of Robert Campbell by the late William S Campbell we find the words, "1898 — I joined the staff of the Belfast Hospital for Sick Children". This is an error, for it was on 22 September 1897 that Robert Campbell was appointed honorary assistant surgeon on the occasion of the promotion of J S Morrow to be an honorary attending surgeon. This appearance of "Johnny" Morrow as a full surgeon on the staff of the Children's Hospital may surprise those who remember him only as physician (and finally the senior physician) in the Royal Victoria Hospital. In fact Morrow was a surgeon in the Children's Hospital from 1893 until 1898 when he resigned his appointment there, at least partly because of a finger injury, and the vacancy thus created was filled by Robert Campbell's promotion. Campbell thus found himself a full surgeon one year and two weeks after he first joined the staff — a much shorter interval than that suffered by some of his successors.

Campbell's election in 1897 was unanimous for he was the only candidate. His appointment was proposed by Viscount Massereene and Ferrard, a patron and life governor of the hospital. This was highly appropriate, for the noble patron was a descendant of the Sir John Clotworthy who had greatly countenanced the Presbyterians about the Sixmilewater in the early seventeenth century, among whom was Robert's ancestor Hew Campbell. The vacancy for an assistant surgeon which followed Campbell's promotion in 1898 was filled by Andrew Fullerton, who had made a previous unsuccessful attempt to join the staff of the Children's Hospital in 1895, when he had been decisively defeated in an election for the post of assistant physician. Those who remember "Andy" will be able to exercise their imaginations in creating a picture of him as a physician, instead of the dynamic, bustling, purposive surgeon we remember.

Robert Campbell was not the first member of his family to serve on the staff of the Children's Hospital. His elder brother John was an honorary assistant surgeon from February 1891 to December 1892, when he resigned on being appointed

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This address by the late Dr Calwell was found among the archives of the Royal Victoria Hospital by Dr J S Logan. It was probably written soon after 1960 and is published now because of its relevance to the practice of day surgery.

honorary attending physician in the Samaritan Hospital, which post he held for thirty years. The title of the post in the Samaritan Hospital may be misleading to those who are not accustomed to the nomenclature of the days when obstetricians and gynaecologists were still called physicians. I am not sure whether they chose that designation as being more respectable, and conferring a higher professional and social status than accompanied the title "surgeon", or whether the surgeons would not have them in their number. The switch by John Campbell from paediatric surgery to gynaecology is a good example of the versatility of our medical forbears.

When Robert Campbell joined the staff of the Children's Hospital in 1897 the direct links with the medical staff of the first hospital in King Street had not all been severed. No member of the original medical staff was still on the active list, but Brice Smyth was honorary consulting physician. Other members of the King Street staff still connected with the hospital were J W Byers who was the other honorary consulting physician, and W G MacKenzie, honorary attending surgeon. The full surgeons were W G MacKenzie and J S Morrow. The other assistant surgeon was T S Kirk who had been appointed in 1895, at the same meeting of the Board at which Andrew Fullerton had failed in the election for an assistant physician. The number of beds in the hospital was forty which meant that the two full surgeons had charge of twenty surgical beds between them. The assistant surgeons were in charge of outpatients and were also to assist the surgeons when required. They were to attend at such hours as the Board of Management should appoint. The extern was open every morning except Sundays and Christmas Day.

During Robert Campbell's first (and only) year as assistant surgeon, he and his colleagues saw 826 new surgical outpatients and performed 213 minor operations. How much work they did in the wards is not recorded. No separate return of the number of attendances of surgical outpatients is given, but if it was proportionate to the number of new patients it must have been about 3,300. There was no house surgeon to relieve the honorary staff of any part of the burden, and there was only one nurse for the whole extern department. Most of the conditions seen in the children attending the surgical extern in 1898 would be seen in children forty or fifty years later, but proportionately much less frequently and in a very different distribution. Apart from 114 cases of abscess (of unspecified aetiology) the commonest cause of morbidity seems to have been tuberculosis. There were 53 children with caries of bone (spinal caries in 25) and 75 with arthritis (hip 34 and knee 23). Although it is not stated that these conditions were tuberculous. it can safely be assumed that very many of them were, for in the inpatient return for the same period there were 34 cases of tuberculous arthritis. There were only four dislocations, 21 fractures, 17 wounds and six cases of burns or scalds, which shows up very favourably against today's experience of these accidents. However, apart from the absence of the heavy motor car traffic of our time, it is clear that general practitioners were treating most of the casualties at home. Doctors who practised in Belfast at the time (and how much more country doctors) certainly treated simple fractures without recourse to hospital. Enlarged tonsils were recorded in only five children; cleft palate and hare lip in six; genu valgum in 13; necrosis of bone in 17; talipes in 15; ulcers in 16; adenitis (unspecified) in 55. Inguinal hernia was seen in 68, and this condition was soon to attract the special interest of Robert Campbell.

After his short apprenticeship as assistant surgeon Campbell joined T S Kirk in the surgical ward where they shared some twenty beds between them, and in their first complete year together (1899) cared for 234 children of whom 8 died. They performed 252 operations. The most common condition they treated was tuberculous arthritis — 75 cases. There was caries of bone in 36 (probably mostly due to tuberculosis), cleft palate in three, congenital dislocation in one, acute intussusception in one, tuberculous adenitis in 10, talipes in five, but there were only eight cases of inguinal hernia. This last figure is clear evidence that the operative treatment of this condition was still not common, for the outpatients records for that year show that 58 children with the condition were seen in the extern department.

The year of Campbell's appointment as full surgeon also saw the appointment of Miss Amy Isobel McTaggart as matron of the hospital. She came to Belfast from the Royal Edinburgh Hospital for Sick Children. Her tenure of the post was short for in 1906 she resigned to become Robert Campbell's wife. This romantic example was followed in 1908 by T S Kirk who married Miss Constance Rome, Miss McTaggart's successor as matron. Kirk accomplished in 18 months what it took Campbell eight years to accomplish! The Board of Management acknowledged Miss McTaggart's resignation with the following resolution: "That while most heartily congratulating Miss McTaggart on her approaching marriage and wishing her every happiness, the Board desires to place on record its deep sense of the irreparable loss sustained by the Institution in her retirement, after a service of eight years of the most devoted and efficient character". The Board presented Miss McTaggart with a canteen of cutlery and a purse of sovereigns. The medical staff presented her with a silver salver, entrée dish and spoons.

Robert Campbell has been described as a pioneer in paediatric surgery by R W M Strain[1] in his history of the Ulster Medical Society and as "a great general surgeon" by Robert Marshall[2] in his history of the Royal Victoria Hospital (1903–53). E W McMechan[3] says of him, "a man whose work was characterised by great care, skill and originality, and by what has been described as restrained and discriminating boldness. He was among the first to use rubber gloves and certainly introduced them to Belfast. He was using catgut boiled and hardened in formaldehyde some three years before it was generally advocated, and he introduced caps and masks". McMechan related that when the patients were transferred from the Royal Victoria Hospital in Frederick Street to the new hospital on the Grosvenor Road, it was arranged that John Walton Browne, the senior surgeon, would perform the first operation. But on the night before this "opening ceremony" a patient was admitted with a strangulated hernia and Robert Campbell operated on him — an admirable example of junior being prior.

Robert Campbell is best known for his early advocacy of the operative treatment of hernia, even in the youngest infants.[4, 5, 6, 12, 13] Details of this have been given in the late W S Campbell's account of his uncle's life and times.[7] The influence of Campbell's practice can be easily demonstrated from the hospital returns. I have already mentioned that in 1899 only eight operations for inguinal hernia were done. How many of these were for acute conditions such as strangulation it is not now possible to say, but probably all, for we have Robert Campbell's own

statement that when he joined the staff of the Children's Hospital it was not the practice to treat uncomplicated hernias in young children by operation. In his second year, 1900, there were eleven cases of inguinal hernia in the surgical ward, and four of strangulated hernia, which clearly shows a change of practice. The figures for succeeding years reflect the change even more clearly:

Year	*Admissions for inguinal hernia*
1902	35 (4 strangulated)
1903	47 (1 strangulated)
1904	63 (2 strangulated)
1907	108

There cannot have been an epidemic of inguinal hernia in Belfast at the time, nor any remarkable change in diagnostic acumen which led to the discovery of hitherto undiscovered cases. The only reasonable explanation is that for the first time radical and acceptable treatment was being afforded to children who had hitherto been allowed to grow up with their hernias until they were considered old enough to be operated on.

The surgery of childhood was carried a stage further when at the 77th meeting of the British Medical Association held in Belfast in 1909 under the presidency of Sir William Whitla, J H Nicholl[8] of Glasgow advocated that a much larger share of the operative work of Children's Hospitals should be done in the outpatients department. Robert Campbell[6] was in entire agreement "as regards operation on children who could be easily carried home by the mother. He was in the habit of operating in the outpatient department on hernia cases". Andrew Fullerton[9] struck a note of warning about possible medico-legal consequences, but said his practice largely agreed with that advocated. "With the authority of such well-known surgeons as Mr Nicholl, Mr Stiles[10] and Mr Campbell he was sure more work would be done in the outpatient theatre". The matter was referred to further when Fullerton[11] wrote a letter to the British Medical Journal in 1913 recalling the 1909 meeting, and continuing: "So convinced was I by Mr Nicholl's results that I immediately began to add hernia and hydrocele to the list of my outpatient operations, and my colleagues followed the same course. Since then we have enormously extended our scope, and personally I have no hesitation in operating on hare-lip, sometimes cases of cleft palate, knock-knee and bow-leg in children about 4 – 5 years of age, enlarged tonsils, adenoids, naevi and tuberculous joints in the upper extremity, glands, tumours and cysts in the neck and many other conditions requiring surgical interference. A few weeks ago I removed in the outpatients' theatre an occipital meningocele with an entirely successful result. In this way numbers of children are relieved who could not otherwise have been properly treated on account of shortness of beds and lack of funds. The results have borne very favourable comparison with those obtained in the wards, and the utility of the hospital has been greatly increased. The surgeon in charge of outpatients, instead of being a glorified house surgeon or a finger-post to the wards, has now opportunities for practice and research hitherto denied him".

Reading this one might doubt who was the pioneer, Robert Campbell or Andrew Fullerton, but study of the available literature, some of which I have quoted, leaves no doubt that it was Robert Campbell who, as well as pioneering the operative treatment of hernia in young children in the wards, had already by 1909 begun to operate on these children as outpatients. Andrew Fullerton no doubt extended the scope of outpatient surgery as he describes. He was not one to sit down and wait until time would bring him promotion and charge of his own beds.

This wide extension of operative surgery in the extern had repercussions. At the end of 1912 a member of the Board drew attention to the "severe" operations being done in the extern theatre, and the risk of sending the patients home immediately. The matter was referred to the medical staff for their views, and Andrew Fullerton (although still a junior member of the surgical staff) was deputed by his colleagues to attend the next meeting of the Board and convey their views. He told the Board that he had been attending the hospital for 15 years and there had never been a death following an operation in the extern department. They had extended their work in the extern department largely following the advice of Mr J H Nicholl[8] of Glasgow. The practice of operating in the extern left the hospital free to do a larger work without increasing the cost. In the case of young infants it was an advantage to have them under the care of their mothers. A majority of operations were for hernia, and on looking up his records he found a cure rate of 95%. The member of the Board who had first raised the matter expressed pride in the magnificent work of the medical staff. "There was to be no curtailment of the work, and as the Staff were working in complete harmony with the Board, the matter would be considered settled".

In the annual report for 1916 the Board recorded that "a very special recognition is due to Mr Robert Campbell, whose work in the wards and extern department has been invaluable, as he has taken on himself the largest part of the burden of the numerous operations performed both in the wards and the extern department, very greatly in excess of the normal calls on his time, owing to the reduction of our staff". This refers to the absence of both outpatient surgeons Andrew Fullerton and P T Crymble on war service in the Forces. The next reference is in the annual report of the Medical staff for 1920 which reads: "During the year the Staff, with deep sorrow and regret, has to report the loss of two members by death, Mr Robert Campbell and Sir John Byers. Mr Campbell was a devoted friend of this Hospital and for the lengthened period of twenty-two years he gave lavishly of his time and great surgical talents to the best interests of the institution".

The Board added: "Mr Robert Campbell, for many years a distinguished member of our Surgical Staff, and who, during The War, when our staff was depleted by the younger men serving, gave of his skill and time most self-sacrificingly". And so Robert Campbell left the scene prematurely, and Andrew Fullerton was elected honorary attending surgeon in his stead.

When Campbell was appointed to the staff of the Belfast Hospital for Sick Children he found it in full commission. It justified the hopes of the founders of the hospital that Campbell, Fullerton and their colleagues, in their time, so advanced the practice of paediatric surgery in the city, not only by hard, conscientious (and unpaid) work, but also by innovation.

The changing surgical practice in the treatment of inguinal hernia following Robert Campbell's appointment to the Belfast Hospital for Sick Children

Year	*Treated in Outpatient Department*	*Treated in Surgical Wards*
1892	21	1
1893	report missing	
1894	not stated	1
1895	not stated	1
1896	33	1
1897	46	0
1898	68	10
1899	58	8
1900	57 and 2 strangulated	11 and 4 strangulated
1901		
1902	119	35 and 4 strangulated
1903	167 and 1 strangulated	47 and 1 strangulated
1904	157	63 and 2 strangulated
1905	154 and 1 strangulated	69 and 3 strangulated
1906	197 and 2 strangulated	87
1907	190	108
1908	229	79
1909	157 and 11 strangulated	90 and 1 strangulated
1910	107	93
1911	160	86
1912	108	59
1913	177	54
1914	176	56
1915	192 and 4 strangulated	55
1916	171	51
1917	202	50
1918	178	30
1919	195	12
1920	212	15

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Historical Review

Science, public health and genetic services

Menary Lecture, 14 March 1991, Nuffield Department of Child Health, The Queen's University of Belfast.

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In order to understand genetic services, it is necessary first to discuss the role of science and the role of public health in genetic services. In discussing the role that science can play in the planning and conduct of genetic services, it is necessary to begin by asking the questions "what is science and what are the limits of science?" There is indeed widespread misunderstanding about the meaning of science, even among the health professionals. There are two assumptions that are made about modern science which are incorrect and which greatly mislead people. The first assumption is that the role of science is to collect facts and to arrange them in order to be able to explain how the world works. Neutral, objective scientists observe the world and may experiment with parts of it, but they always remain detached. Provided that they follow the rules of scientific method, their own beliefs, attitudes and desires are irrelevant to the practice of science.[1] This view of science has now been widely discredited. Two major objections to the "neutral facts" view of science are that:

(a) scientists are not detached from the world, but are part of it, so that the very process of science carries the values, prejudices, and beliefs of scientists and the communities in which they live;

(b) facts are a product, at least in part, of the process of searching for them. Information becomes fact only when a scientist working within a particular theoretical framework and using a specific methodology, creates concepts and measurements.[1] In the disciplines of physics, Albert Einstein and Niels Bohr clearly demonstrated over 75 years ago that in physics you cannot keep the scientist out of the equation. Since that time this has been clearly understood by theoretical physicists. In other words, scientists do not escape social influence in their perceptions. In short, science is a social process, an institution, and it must be analysed and understood as such.

It is high time that medical scientists put aside the notion that they are a group of objective scientists who are collecting and organizing facts which are then used in planning and delivering medical services. In the medical world there are frequent organized meetings of "experts". Calling someone an expert is a form of sympathetic magic, by giving something a name, it becomes what the name symbolises.

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Thus, by organizing a meeting of experts, we merely ensure that the beliefs and assumptions of the group of experts are embodied in the recommendations.

The second assumption which is widespread among medical scientists today is that issues in health can best be addressed by objective scientists who know the facts. Health is all about the quality of life and science does not address issues of quality. In other words, science cannot decide on good versus evil, nor can science tell individuals or groups how they wish to lead their lives.[2] Science properly conducted can provide information which the people can then use to make their own judgements about their own lives. It is important that we all understand the above limits of science when we conduct our work in genetic services. In other words, we certainly must use science in genetic services, but we must use it properly.

There are two kinds of science that we will use in genetic services — clinical science and epidemiology. What is epidemiology? This is perhaps best explained through an analogy. Imagine a football game.[3] The clinicians are the players on the field. As such they are personally involved in the real world of action. They are in direct contact with the ball and the other players. The clinicians know in great detail from personal experience just exactly what is going on in the game and they must repeatedly make quick decisions that may profoundly influence the outcome. They talk with each other as the game progresses, making suggestions, sharing experience and giving encouragement.

Then suddenly the game is half over and what happens? The players leave the field and go to a meeting. At this meeting someone called a coach begins to advise these players on how they should play during the second half of the game. On what basis? The coach has not been on the field in actual contact with the ball or other players. The coach has been sitting on the sideline, carefully observing the overall pattern of play from a distance. The coach is the team's epidemiologist. While coaches must understand all the rules of the game, they must also have further skills and knowledge — to know how to make correctly observations on groups of players, how to interpret these observations, and how to communicate them to the players in the most effective way.

During the meeting an essential, dynamic interplay takes place between the players and the coach. The players report their experience on the field and their impression of what is going on. The coach respects this important information and takes it seriously, evaluating the players' reports, making an overall assessment of the situation, and then advising on how to play. The players respect this advice because of the coach's skills and unique perspective. At the same time there is often a tension between the players and the coach. While it is hoped that each side respects the other, each may also feel envious. The coach may envy the players the excitement of participation in the action, the adrenalin surge of play, the opportunity actually to touch the ball and make those last small but vital judgements on which way to turn. The players may envy the coach the luxury of sitting quietly on the sideline, not running out of breath (staying up all night), not taking the risk of being injured (sued), and yet having so much authority and so much to say about the course the game will take. This tension between the players and coach may at least to some extent simply be a natural consequence of the nature of the game and may even be constructive as long as mutual respect remains.

In football today, no team would want to be without a coach. Sadly we are not there yet with health care. Some players talk only with the other players on their own team and go to conventions where only players attend and talk (or even brag) about their individual play. Some coaches feel superior to their players and will not listen to them, but go to conventions attended only by coaches and talk about the theory of the game or discuss endlessly the details of the rules of the game. Slowly, however, it is becoming clear in health care that both the clinical viewpoint and the epidemiological viewpoint are equally correct and valid. Both viewpoints represent pieces of the truth that complement each other in a way that brings forth the whole truth. We need players and coaches who respect and communicate continuously with each other.

Having illustrated the epidemiological approach, now what must be said is that the public health approach to genetic services or for that matter to any other health services, is to combine the scientific assessment of the problem using epidemiology with the planning, evaluation and monitoring of the health services directed at that problem. What happens then if we apply this public health approach to genetic services?

Genetics began as a laboratory science and, when the technology became applicable to humans, evolved to a combination laboratory/clinical medical specialty. The clinical geneticist, like all clinicians, has focused on individual cases. Still today most clinical geneticists practise differential diagnosis and treatment, although the nature of the genetic diseases demands greater emphasis on family history during diagnosis and greater emphasis on counselling as part of the treatment.

Any clinical practice, including clinical genetics, is deeply influenced by the system of health care in which the practice occurs. It doesn't take long for a new physician in practice to discover that he is not an island unto himself but part of a network of physicians who in turn are part of a system of services.

More recent advances in genetics are now forcing a broadening of the purely clinical approach. For example, the possibility of preventing genetic disease, through, for example, prenatal screening and neonatal screening has brought the public health approach into genetic services. Screening for genetic diseases began with neonatal screening which was quite straightforward with not too many ethical complications. When prenatal screening came into the picture, however, there were immediately all kinds of problems. For example, there is no use in doing prenatal diagnosis on a pregnant woman if she would never consider therapeutic abortion. These prenatal screening programmes have proven to have significant false positive and false negative rates and these can be quite devastating mistakes for a family to experience. Nevertheless, the prenatal screening programmes have been effective and it has, for example, been possible completely to eliminate new cases of thallasaemia major from certain regions in Italy where it was previously of considerable prevalence. However, elimination of thallasaemia in Italy was only possible through extensive community education programmes so that all of the necessary screening could be done. It is also interesting to note that although there was a high prevalence of Catholic families in these regions, if the need for screening for thallasaemia was explained to the parents, there was a high rate of acceptance of the procedure and also a high rate

of asking for therapeutic abortion if the prenatal diagnosis was positive. This Italian experience is certainly relevant to the organization of genetic services in Northern Ireland.

A new procedure offers the possibility for eliminating genetic diseases without abortion. This is pre-implantation genetic diagnosis combined with *in vitro* fertilization. There are studies going on in the UK and in the USA which illustrate this new possibility. In both cases, couples who are known to be carriers of a severe sex-linked genetic disease are included. In other words, the child will only have the genetic disease if it is a male. So using IVF the egg is removed from the woman and fertilized *in vitro* with the partner's sperm. When the fertilized egg has reached the four-cell stage, one of the cells is removed and examined to determine the gender of the fertilized egg. If it turns out to be male, the egg is destroyed and if it turns out to be a female, the fertilized egg is re-implanted into the woman. Since at the four-cell stage there is not yet differentiation into fetus or placenta, it is argued that this destruction of a four-celled egg is not in fact abortion.

But we are immediately faced by some serious problems. First of all, this procedure demands IVF. Another epidemiologist and I carefully studied the world's literature on IVF and found that the efficacy of this procedure was very low — between 5 – 10% of the times one can expect to have a live baby after an IVF cycle.[4] Furthermore, there are serious risks which have been markedly under-estimated by the clinicians involved. IVF is a sad example of modern salesmanship in health services. The public and the politicians have been fed a great deal of bias, if not false information, about success rates and safety with regard to IVF. Fortunately the Director of one IVF clinic in Northern Ireland has been actively involved in the monitoring of IVF services in the UK.

A second problem with regard to pre-implantation genetic diagnosis is an ethical one — where to draw the line. If we can use this procedure to eliminate serious sex-linked genetic diseases, we can also use this procedure to eliminate female children. As you probably know, there have already been cases in India of couples getting prenatal diagnosis in order to eliminate any females so that they can have a son. But where do we draw the line? Do we eliminate offspring with crossed eyes? Even if government services have ethical controls, commercial genetic services have few or none.

While there are a number of ethical dilemmas involved with therapeutic medicine which are quite commonly discussed, there are some ethical dilemmas associated with preventive medicine and screening which are quite different and have received very little attention.

1. Screening involves large numbers of people, so unethical decisions, whether at a technical, clinical, social or legal level, can have widespread effects.
2. Prevention is usually addressed to healthy people, and unethical decisions can interfere with an entirely or apparently normal life.
3. Preventive medicine and screening procedures are aimed to influence healthy people's behaviour — to motivate them to seek genetic screening. It is likely to reach the better educated sections of society preferentially so the issue of equity is present. This is particularly important for genetic diseases like

thallasaemia and sickle cell disease which occur mostly in lower socio-economic groups.

4. Since it involves testing large numbers of unaffected people in the search for an affected minority, screening should be practised to the highest possible standard with suitable training, a quality control system, and a professional code of practice.
5. In case of the slighest doubt, because of its serious and life-long implications, a genetic diagnosis should, as far as possible, be confirmed by an independent approach.
6. Results should be monitored regionally and nationally, with particular emphasis on false-positives and false-negatives.

Thus we see the need for the public health approach in screening for genetic diseases. One of the most important applications of the public health approach to genetic diseases is for the rational planning of these services. Sadly it must be pointed out that there is very little rational planning of any kind of health service today. Very often it is only by accident that a particular service becomes available. If an interested clinician at a hospital wants to start a genetic clinic or an IVF clinic, then he or she can set about doing it, but in no systemic or rational way.

In the rational planning of genetic services, the first step is to determine the need for such service. This involves using epidemiology to determine the prevalence of genetic diseases. For example the World Health Organization publication on genetic services[5] gives epidemiological estimates of the number of people with certain genetic diseases in Europe. Every year in Europe 4,500 children are born with cystic fibrosis. There are now approximately 23,000 living cystic fibrosis individuals and it is estimated that if these same numbers continue to be born and receive the same type of care now available, we will eventually have 112,000 individuals with cystic fibrosis in Europe. This illustrates that we can in fact estimate the need for genetic services.

The second step in rational planning is to determine the ability of the present services to meet the need that has been determined. In other words, can the services meet the need, and if so, how well and at what cost and what danger? There is usually very little done in any country to answer these questions. This involves the assessment of the technology used in genetic services. In every country in Europe there is a careful system to evaluate any new drug before it is allowed on the market. On the other hand, a new procedure or a new machine can be used tomorrow in any country in Europe without any necessity for its careful assessment. As a result, many procedures and technologies come into widespread use before any adequate assessment. The World Health Organization did a study of routine obstetrical procedures and discovered that only about 10% of them have been adequately scientifically evaluated as to whether or not they are of any value.[6] This is an example of the urgent need to bring good solid scientific methodology into the assessment of what were are doing, including genetic services.

The same holds with regard to assessment of the safety of new procedures and technologies. Many IVF clinics advertise or state that IVF is safe, when in fact we now know that there are all kinds of risks both to the woman and to the baby.[4]

For example, the perinatal mortality rate for babies from this procedure is four times higher than usual. We need to look more carefully at the risks of procedures and technologies and be more honest with our results. We also need to assess the cost of procedures. This is complicated and must involve health economists in order to include indirect costs and the costs of failures.

Once we have information on the ability of the service to meet the estimated need, we come to the moment of decision on whether or not we want such a service. What should be the priority for funding such a service in a health care system and who should decide? Until recently most of these decisions were made by physicians, but this is inappropriate since these are not medical decisions. No country in the world today can afford to do everything that is possible to do with medical procedures and technologies — transplant all of the hearts, dialyze all the kidneys, give IVF to all the infertile couples. It is only the public and its representatives who are in a position to make the decision with regard to who shall live. Incidentally, the people who are suffering from a condition are not the ones who should decide whether or not there should be services for this condition. IVF clinicians all quote the demand for their services from infertile people. And yet when a poll of the general public asked for priorities on how to spend money for various medical procedures, treatment of cancer was at the top and IVF at the bottom.[7]

Once a decision has been made to deliver a particular service, the next question is how to deliver this service. Here it is necessary to involve the consumers of those services so that they will be delivered in a way that is acceptable to the public. Thus, to open a clinic for thallasaemia you need to approach the families with thallasaemia in your community, and involve them actively in planning and assessing and monitoring this service. Most countries have active lay organizations for the various genetic diseases and these organizations can play an important role in determining the nature of services.

Once the services are in place, it is then necessary to have quality assurance programmes. Whether medical people like it or not, this is the wave of the future. Quality assurance protects the public from bad practices and also helps to be sure that the money is well spent. One of the goals of such quality assurance is to pay only for appropriate care. In the case of genetic diseases this would ideally get to the point where the clinicians would be paid according to their role in reducing the number of cases of genetic diseases. It could be that some day in the future we will get to the ideal that was proposed by Hippocrates several thousand years ago — that the physician should be reimbursed for all of the well people rather than for the sick people in his practice.

It is clear from what I said that genetic services need to involve a close collaboration between the clinicians, the epidemiologists, the other public health personnel and the lay public. This is the direction that all health care is going today. Physicians cannot make ethical decisions nor can they make priority decisions with regard to health services. But we can use the best science to assess our procedures and practices and then give this information totally and honestly to the public and their representatives, so that they can decide what they would like us to do.

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Historical Review

The scholarly work of James Smiley,

OBE, MD, MD (*h.c.*), FRCPI, FFOM (*h.c.*), FFOMI, DIH

Sir Peter Froggatt

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Jim Smiley (1907–1988) was the most important and eminent occupational medical specialist Ulster has produced this century, perhaps ever. From a provincial base as industrial medical officer to several Belfast companies, most notably Short Bros. and Harland, and as Appointed Factory Doctor for East Belfast, he scaled every peak the practising specialty had to offer in these islands, as well as gaining unique international recognition. In summary: to his primary degrees (Queen's, 1930) he added MD "with high commendation" (1946) and DIH (1948); he was a long-serving council member and (in 1967) the only Irishman to be president of the then Association of Industrial Medical Officers, UK (now the Society of Occupational Medicine)*; he was a Foundation Fellow of the Faculty of Occupational Medicine of the Royal College of Physicians of Ireland (1976), its first vice-dean and later (1981–83) its dean; he was elected an *ad eundem* Member (1976) and then Fellow (1978) of the Royal College of Physicians of Ireland and an honorary Fellow of the Faculty of Occupational Medicine of the Royal College of Physicians of London (1982); in 1984 he was chosen to join *les superbes* of the exclusive Ramazzini Club (confined to 25 members from each of USA and Europe); and became MD again of Queen's in 1986, this time *honoris causa*, "for services to occupational medicine". His early OBE (1960) recognised his contributions to industry and presaged further ones. In 1988 a handsome endowment from his family enabled the Irish Faculty to do what it so dearly wished to, namely establish a Smiley Memorial Lecture and Gold Medal. Dr Jack Eustace, the Faculty's first dean, inaugurated the annual series in November of that year.[1] I was privileged in 1989 and Emeritus Professor Richard Schilling in 1990.[2]

Smiley was essentially a practitioner and promoter of his specialty, and one of its leading intellectuals, visionaries and strategists. He was not by practice or training primarily a researcher, but he made his own opportunities, and his investigative work, though not abundant, includes some seminal projects and covers in a remarkably prescient and adept way many of the ubiquitous problems in occupational medicine as it has developed since the second world war. Being to a large extent self-taught in the *mystiques* of the researcher he brought to bear on his

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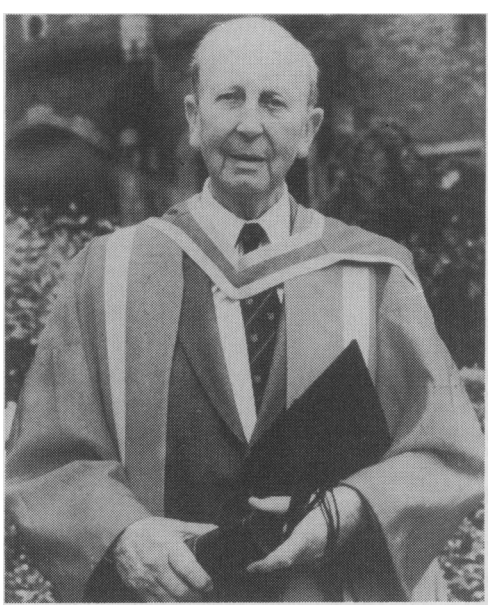
Based on the second Smiley Lecture given at the Faculty of Occupational Medicine, The Royal College of Physicians of Ireland. Dublin, 17 November 1989.

topics a freshness of thought, a questioning of basic tenets and assumptions, and a forthright intellectual honesty bolstered by shrewdness and ability, and untrammelled by those wranglings over techniques and schools of thought which are too often the marks of the "trained" investigator. Furthermore, his research was conducted from busy practice: Smiley had no academic base nor had he unusual access to university resources, his only attachment being as a part-time lecturer at Queen's, first in industrial toxicology (1952 – 6) and then in industrial medicine (1959 – 72), barely in total the full-time annual equivalent of two weeks' work, and after the DPH was dropped in the mid nineteen-sixties not even that. His researches are important enough to deserve a synthesis and an analysis, and these I attempted in my Smiley Lecture. My credentials for the task, if not overwhelming, were at least respectable and, I hope, convincing in that one of the topics — accident proneness — became a research interest of my own;[3] I developed another — industrial absenteeism — into my own PhD thesis;[4] Smiley and I were members of the research group which explored a third — flax byssinosis;[5] yet another — the early factory inspectorate — was germane to my lecture inaugurating the Dublin Faculty;[6] while a fifth — nineteenth century Belfast medicine — is still very much an interest of my own.[7-16] This confluence of topics was neither pure coincidence nor naked plagiarism but in part mutual opportunity and in part Smiley's influence on my own intellectual development, since I worked as his assistant in Short Bros. and Harland from June 1957 to September 1959, two stimulating years during which to my advantage and benefit I was able to penetrate the reserved and misleadingly austere demeanour of the man to discover the sharp intelligence, breadth of culture, deep learning, sincere conviction and warm personality which lurked beneath. What follows is a shortened version of my Smiley Lecture modified for this journal.

Smiley wrote 12 articles in abstracted journals[17-28] and one in a non-abstracted one;[29] an MD thesis which earned a "high commendation" grade;[30] contributed one chapter and much of another in a government-sponsored report;[31] gave the Milroy Lectures (of the Royal College of Physicians) in London,[19] the McKenzie Lecture (of the British Medical Association) in Dublin,[26] and the first Scott-Heron Lecture in Belfast,[24] all on different topics; and lectured, consulted and advised at many centres in these islands and abroad. I will discuss these grouped by topic, and so far as possible chronologically, since Smiley's writings conform to a clear pattern of choice and show a growing authority in treatment, and an intellectual maturity in discourse and style.



Jim Smiley, on the occasion of receiving his degree of Doctor of Medicine (*honoris causa*) at Queen's University, Belfast, July 1986.

Accident-proneness

Smiley's first project was for his MD thesis.[30] His results were widely promulgated, being of potentially ubiquitous application, and led to an invitation to read the Milroy Lectures in London in 1955, one of very few Irishmen so honoured.[19] They were controversial, but were generally,[32] though inevitably not universally,[33] well received. In 1958 he published a short commentary[23] and in 1964 co-authored with me a detailed "state-of-the-art" review.[25] These four publications comprise Smiley's writings on the subject. His core work is his thesis[30] and his derivative Milroy Lectures:[19] in fact they can be treated as one because in the intervening nine years his views changed very little, and in the Lectures he cites only four additional publications from the plethora of new work available. It would be wrong, however, to interpret this as intellectual rigidity or lack of scholarship. Much was read but few works were quoted because many dealt with unanalogous data, e.g. involving coal-miners,[34] railway shunters,[35] automobile drivers,[36] and trainee pilots,[37] or with statistical interpretation and theory[38-40] which were unconducive to his interests or, as he always frankly admitted, were beyond his expertise.

What was the importance of his accident-proneness work? Smiley's MD thesis, though a novice work, was balanced in argument, thorough in execution and, except for some zealous speculation, mature in judgement. He was unfamiliar with the essential techniques of numerate analysis of repeated events, (a grave handicap in accident studies), but he grasped with that mixture of deep intelligence and intuition which were his hallmarks, that shortcomings in his data could produce artifactual results, and the self-imposed rigour of his approach set a benchmark for all future work on minor industrial accidents, and reached a demanding standard which many historic publications in the field do not approach. The *desideratum* of statistical "curve-fitting" (Poisson and Negative Binomial) was done by a Queen's colleague (Dr A Beacham, PhD) — now a simple soft-ware program would suffice — and though Smiley versed himself in the interpretative pitfalls he underestimated the importance to the validity of his results of the confounding of "tendency to have" with "tendency to report" an accident. He was measuring overt expressions of what was then called "the nervous temperament", of which frequent surgery attendance is one, and so cause could have been taken as effect rather than vice-versa. To this well-publicised contemporary criticism[33] the sharp acuity of retrospect has added three more, explicit or implied. Firstly, in much of what he wrote Smiley seemed to accept the pristine concept of accident-proneness as a reasonably stable inherent property rather than as a more variable tendency waxing and waning with a multitude of innate and external factors (worry, fatigue, etc) and with a substantial element of chance superadded. This latter concept, however, is based mainly on statistical work *after* Smiley's thesis was published! But in fact his case histories show that he did *not* as a generality accept the pristine form as his critics alleged: his thesis was more flexible. This undoubtedly led to some inconsistencies in his interpretations and circles to be squared, a vulnerable flank which I will mention below. Secondly, he relied mainly on subjective clinical signs in his groups as indicating "the nervous temperament", such as palm sweating and pulse rate rather than on psycho-motor tests and psychometric measurements. This implied criticism is harsh: psycho-motor tests had in the past been unreliable and poor correlates with the accident record, while

simulators and psychometric machines were popularised for high-skill selection during the second world war, and in 1945, when Smiley's field-work was done, they were either unavailable, expensive, or uncertain, and often all three. Thirdly, he was too speculative in that with little direct evidence he incriminated the hypothalmus as the regulatory centre in "accident-proneness" postulating that since it acted as the focus of autonomic activity it could normally be maintained in precarious balance by excitatory and inhibitory impulses from the cortex either of which could be impaired in the accident-prone state. This offended the ascendent school of the patho-physiological reductionists, was overtly simplistic, lacked something of his usual circumspection, and sat oddly with the meticulous garnering of his data. It looked both then and now altogether like a bridge too far. Smiley in his zeal had ventured beyond his charted territory, tempted as any inexperienced explorer by excitement to push back the boundaries of knowledge. He often later wryly told me that in his exuberance he tried to conjure too much out of the hat!

I can reply to these criticisms. As a statistical novice Smiley could not challenge the *statistical* basis for the 'accident prone syndrome' which predicated that all those exposed to an equal risk of an accident are not equally liable to incur one, that this "liability" is innate, distributed among the population in a particular way (a so-called "Pearson type III" distribution), and is more or less permanent. To this some would legitimately add the refinement that if "liability" *does* change, it changes to the same degree in each individual and is dependent strictly on the number of accidents incurred. As an acute observer Smiley was understandably sceptical of such a mechanistic concept on the *clinical* evidence, a medium in which he was at home. In both his thesis[30] and Milroy Lectures[19] he had clearly envisaged that although some employees were more accident-prone than others, the degree of accident-proneness could wax and wane and not be the eternally inflexible, untreatable diathesis of the statistical theory. Any incompatibilities between the statistical and clinical concepts, and they are there, arise from Smiley's understandable limitations as a statistician rather than as a clinician. The brusque dismissal by such as Whitfield[33] that "the main conclusion to be drawn [from Smiley's work] is that proneness to report minor injury can be added to the other known signs of emotional disturbance", may be valid both at strict logic and in particular instances, but it is unrealistic and unjustified regarding the work as a whole.

The adverse comments disappointed Smiley: it was after all his first project; he was no hardened veteran to research controversy. But he neither trivialised nor ignored them; instead, like a model researcher from whom all can learn, he sought to replicate his findings on another group which would be largely free of such interpretative strictures. Even before his Milroy Lectures (1955) he had obtained a research grant from the Nuffield Provincial Hospitals Trust to study road accidents amongst bus drivers. His field-work colleague, however, left at an early stage in the study and in the event the Short Bros. and Harland statistician (the late W L Cresswell, MSc, PhD) and I concluded the work.[3] Smiley was always helpful with ideas and advice but declined joint authorship except of one invited review article in 1964.[25] In truth he was increasingly out of sympathy with the drift of accident research from the domain of the clinician and experimental psychologist to that of the statistician interested more in the arcane world

of complex discrete distribution theory than in accident causation, still less in accident prevention.[41] Unlike some, he was aware of his limitations. He wrote nothing on accidents after 1964[25] and rarely even discussed them. By now his research interests were moving to areas more congenial to his instincts and expertise.

Byssinosis

Two of Smiley's industrial attachments during the nineteen-forties were to the York Street Flax Spinning Company, and the Belfast Ropeworks. The first used flax, the second hemp, and in both there were long histories of respiratory disease in "carders" and "hacklers". Smiley later wrote: "My interest in the subject dates from 1933 when I entered general practice in [East] Belfast . . . During the Second World War it became increasingly clear that [in the Ropeworks] . . . card room workers were exposed to a respiratory hazard . . . [and] . . . that similar cases were occurring in the early stages of processing flax for spinning . . . In 1947 I recognised the similarity of [this] 'pouce', as the Belfast workers called it, and 'byssinosis', as it was being investigated by Schilling in Lancashire".[24] ("Pouce" — or "pouse" — is from the French *la poussière* meaning dust, evidence of the Huguenot origins of the Ulster textile industry). Smiley described this "pouce" in just 450 words in an article in 1951 on the hazards of rope-making,[18] and likened it to cotton byssinosis, the first worker unequivocally to do so. Thorough as always, he invited Richard Schilling and J R W Hughes, the leading byssinosis researchers in Britain, to examine his cases. They came to Belfast, examined independently 26 of his cases (14 in hemp workers and 12 in flax workers) and 26 controls in a "blind" study, and each had a zero mis-classification rate thus confirming Smiley's observation of the clinical similarity of hemp and flax to cotton byssinosis.[24, 42] Smiley's article[18] also contained pioneer descriptions of extensor tenosynovitis in net braiders, oil follicular dermatitis in hemp "sliver" handlers, confirmed boiler-maker-type deafness in plaiting-machine operatives, and even noted psychological shock in preparers, from encountering imported snakes asleep in the bales of hemp!

Smiley was not content with mere disease delineation; his extensive culture carried his interest far beyond the clinical stigmata so beloved by the traditional occupational physician, and he turned towards the entire canvas of "pouce" including nothing less than a socio-medical history of the Ulster linen industry. He now needed a platform and one conveniently presented on 12 July 1955, in Dublin when he read a paper on the Irish linen trade,[29] a foretaste of later, more mature research. For that he needed time and opportunity. The clearing of accident research from his desk after his Milroy Lectures that year (1955) gave him the time; the opportunity soon arrived.

The facts are worth recording. In October 1958 John Pemberton succeeded Alan Stevenson in the chair of social and preventive medicine at Queen's. Pemberton was a noted respiratory disease epidemiologist from Sheffield University, and he soon recruited the respiratory physiologist G C R Carey (lecturer, then senior lecturer, in social and preventive medicine at Queen's, 1959–1968; the epidemiologist P C Elwood (later director of the MRC Epidemiological Research Unit at Cardiff), and the physicist I R McAuley, PhD (now associate professor of physics at TCD). In 1960, prompted by the work of Smiley,[18, 29] and of John Logan,[43]

they led a government-sponsored study of flax and hemp byssinosis in Northern Ireland. Their Report[5] led to its becoming a "prescribed" disease. Smiley (and myself) were members of the study design group and Smiley wrote the first and part of the second chapter of the Report which dealt with historical aspects.[31] Just before this, in 1959, he had been invited to give the first Scott-Heron Memorial Lecture in Belfast. The lecture was certainly a comprehensive treatment: the first draft, which I was privileged to read, ran to over two hours and the truncated lecture itself took an hour and a half. It was a perfect complement to Pemberton's later study,[5] established Smiley as a byssinosis authority as well as pioneer, and helped to rehabilitate two local nineteenth century worthies — Charles Delacherois Purdon and Andrew George Malcolm — whose early studies of byssinosis[44, 45] had long lain neglected. Smiley was to return to the work of these two in a later article.[27]

After 1960 Smiley wrote nothing further on byssinosis: the decline of the linen and rope-making industries and the "prescription" of byssinosis in Northern Ireland moved it to the wings. Now in his mid-fifties his maturing mind was turning increasingly to the origins, ethics and principles of his discipline rather than its clinical practice and occupational stigmata. Before dealing with these I must first mention his interest in industrial absenteeism. Few know of this but in fact his perceptive ideas embody in microcosm his wide professional culture.

Industrial absenteeism

In his 1946 thesis on accidents[30] Smiley had described an increase in lost time in his accident-prone group, what was later called "short-term absence from work attributed to sickness". He pigeon-holed this for later consideration. During the next decade he became increasingly sceptical of the value and validity of shorter-term absence certificates and wished to establish the true aetiology of the certificated illness, and whether there existed an "absence-prone" syndrome analogous in behaviour to an accident-prone one. He initiated research in Short Bros. and Harland partly along well-trodden paths of longer-term sickness absence,[46-48] but partly also breaking new ground by focusing on absence of one and two days' duration. In 1956 he had written a perceptive article[21] on the causes of absenteeism based on his everyday experience: now he planned to replace subjective opinion with objective fact. But almost at once, in 1957, serious family illness intervened and he asked me to take over the study. I extended it to other occupational groups and signed it up for my PhD thesis, with Smiley as one of my two supervisors.[4] When I later published the material[49-54] Smiley declined any recognition beyond a simple acknowledgement. Perhaps he didn't like what he read! I prefer to think it was his high professional probity and personal altruism so different from some department heads who consider joint-authorship almost a *droit de seigneur*! His influence on the swing of ideas in the subject was far greater than his one short article[21] would indicate. I welcome the opportunity to put this on record.

The early factory inspectorate

Smiley's byssinosis research sparked a brighter flame within him than did the increasing aridness of statistics-encaptured accident or absenteeism studies.[41] It also fired his other interests, and increasingly his mind turned to the evolution of

his specialty and to rehabilitating those Ulster doctors who had contributed to it; less and less did it turn to occupational clinical problems; and least of all to any numbers game! Personal experience, charitable outlook, love of country, a keen sense of intellectual inquiry, and strong Christian principles were his inspirations. One article in the nineteen-forties[17] (on "incentives") and two in the fifties,[20, 22] (on the wider role of the occupational physician) exemplify his broader vision. The human outrages of early industrialisation offended him deeply: G D H Cole, the Webbs, the Hammonds, and R H Tawney were his favourite historians; Arthur Bryant his favourite villain. "It astonishes me", he wrote, "that Sir Arthur Bryant could entitle his book on the period [1810–1820] 'The Age of Elegance' — a period which the Hammonds felt impelled to call 'The Bleak Age'".[26] His deep involvement in Methodism, a denomination intimately associated with the emerging industrial society, made his mind and soul fertile seedbeds from which the flowers of his social and occupational interest, involvement and concern grew. The great wealth of material he had assembled for his Scott-Heron Lecture[24] and which (as we have seen) was surplus to immediate requirement, was expanded into his BMA McKenzie Lecture given in Dublin in July 1970.[26] This is a scholarly, perceptive, and sensitive work of wide culture, conviction, and erudition, and places Smiley above that populous class of doctors who in later life turn to the provenance of their specialty but who have seldom the scholarly detachment or the analytical and interpretative facility to do more than tell a story, marshal facts, or reminisce, worthy though these are. History, including contemporary medical history is much more than this,[55] and though Smiley made no claim to occupy the historians' sanctum he has claims to dwell in their ante-chambers. He is one of the few among my medical colleagues who could centre his thoughts on historical issues rather than on institutions or people, though these latter were seldom off his stage. His scholarly qualities are nowhere more evident than in his McKenzie Lecture.

Occupational medicine in Ulster

For 16 years after his McKenzie Lecture (1970) Smiley wrote nothing in professional journals. He was by now well into his sixties and while still professionally busy his leisure interests were turned into the more usual channels of a man emotionally secure in a happy, cohesive and growing family, and at peace with himself. But with the years his thoughts, as is common, though international in cast turned increasingly to his native land. For he was rooted in the soil (of County Down) in a way which the journeyman and metropolitan *bourgeois* can only fumble to appreciate in the abstract but can never experience. His Ulster medical heritage absorbed him: he wished to throw open the minds of his colleagues to the importance and impeccable motivation of the best of their medical antecedents and to the nobility and durability of our common calling. When nearing 79, he submitted to this journal a paper on Andrew Malcolm and C D Purdon,[27] in their polymathic role as pioneers of occupational medicine in Belfast. The Purdon family in particular with its central authority, wide achievements, traditions and sense of continuity, intrigued him more than did the precocious genius of Malcolm and he saw them as embodying much that was laudable in the nineteenth century Belfast profession.

The following year, John Logan, who with Smiley had pioneered the modern study of flax byssinosis[43] and was then, as now, Archivist to the Royal Victoria

Hospital, asked Smiley to place on record his unique knowledge of occupational medicine and its practitioners in Ulster. Smiley, now 80, agreed though in failing health, and he submitted the manuscript of some 6000 words only weeks before his death. It was published posthumously.[28] It is a fitting epitaph: the brisk narrative style, lucidity, and coherence of themes belie his years: nowhere in his writings are they better displayed. His memory, the vulnerable flank of venerable age, is faultless, and if his physical health was failing his intellectual grasp was not. Taking the 1938 Northern Ireland Factory Act as a natural starting point he parades, in telling *cameos,* the leading Ulster occupational physicians of the past half-century, with (as a *continuo*) a lively narrative of the development of the specialty, all presented with insight, authority and balanced judgement, and without flippancy, self-importance, sentimentality, lachrymose nostalgia, or smug anecdote which mar so many reminiscences. As a short primer of the cardinal points in the development of the specialty in Ulster over the past half century it cannot be bettered; as a tribute to his colleagues it is chivalrous and generous though without crass deceit; as a personal testimony it stands well in the *genre.* Those who wish to learn of the man through his opinion of others could do no worse than start here.

Epilogue

I have on occasions invited colleagues of venerable years to record their experiences, even on tape, before they are lost forever. Some have declined; others have demurred until it was too late; the enthusiasm of yet others was not matched by what the history-taker calls "reliability of recall". Among Ulster contemporaries the memoirs of Sir Ian Fraser,[56,57] Bill Strain,[58-60] and Jim Smiley are noteworthy, if very different in focus of interest and style, though Smiley, as I have tried to show, was also a significant researcher. When his posthumously published memoir[28] was safely submitted I know that he was ready to die content.

> Smiley concluded an early article[20] with the following words:
>
> 'Occupational medicine as a vocation beckons to it technically good doctors, generous in their sympathies, liberal in their sentiments, humble in their ignorance, adventurous in their seeking, and courageous when, as sometimes happens, they are misunderstood by those whom they serve'.

This is as good a self-portrait as Rembrandt ever painted.

The Smiley family generously endowed an annual lecture and gold memorial medal in 1988 and I am indebted to them and to the Faculty of Occupational Medicine for inviting me to give the second Smiley Lecture. Dr J S Logan kindly suggested improvements to this article in draft.

*Since this article was written, Dr Brian Beattie (MB, Q.U.B. 1960) has been elected President of the Society of Occupational Medicine.

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Case report

Rapidly progressive obstructive jaundice due to Congo red negative amyloidosis

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Hepatic involvement in amyloidosis is common but obstructive jaundice is a very rare complication. Occasional patients with AL amyloidosis develop obstructive jaundice as a consequence of severe intrahepatic cholestasis, but review of the English literature reveals only 23 such cases. We report a further case of obstructive jaundice due to amyloidosis in which the diagnosis was particularly difficult to establish because the amyloid material was Congo red negative.

CASE REPORT. A 44-year-old previously healthy plumber was admitted to hospital with a three month history of progressive jaundice, pale stools, dark urine and itch. He complained of malaise and abdominal discomfort and had lost 14 lbs in weight. His alcohol intake was 18 units per week and he had no particular risk factors for viral hepatitis. His only medication was oxytetracycline 250mg twice daily for acne rosacea, which he had taken for five years.

Examination revealed deep jaundice. There were no stigmata of chronic liver disease. The liver was enlarged to 4cm below the costal margin, firm, smooth and non-tender. The kidneys and spleen were not palpable. There was no oedema, no peripheral neuropathy and no evidence of cardiac failure. He did not have macroglossia or bruising. Urinalysis revealed glycosuria but no proteinuria. Serum bilirubin was 315 μmol/l (usual range 3–18), alkaline phosphatase 441 U/l (35–120), gamma glutamyl transferase 1025 U/l (7–46) and aspartate transaminase initially 84 U/l (10–40). The prothrombin time was prolonged to 25·5 seconds (13–17), and serum creatinine was 151 μmol/l (40–110). Routine screening tests including plasma glucose were normal. The sedimentation rate was 54mm/hour, full blood count was normal and antinuclear antibody, anti-smooth muscle or anti-mitochondrial antibodies were not detected in serum. Serological tests for hepatitis A and B, cytomegalovirus, Epstein-Barr virus, leptospira and toxoplasma were all negative. Serum IgG was raised,

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19·9 g/l (5–16) but there was no reduction in the levels of the other immunoglobulins to suggest an immune paresis. An IgG paraprotein of 15 g/l was identified on electrophoresis of stored serum. Chest X-ray and electrocardiogram were within normal limits.

Ultrasound scan failed to identify any abnormality except thickening of the gallbladder. Computerised tomography confirmed hepatomegaly with minimal reduction in liver attenuation values; the spleen and pancreas appeared normal. After correction of the prothrombin time with fresh frozen plasma, percutaneous transhepatic cholangiography was attempted to exclude biliary obstruction. The procedure was technically difficult and three passes were made before the biliary tree was entered. There was no biliary dilatation but filling of the duodenum could not be demonstrated and an ampullary lesion was suspected. The procedure was complicated by abdominal pain and a fall in haemoglobin of 5 g/dl. Endoscopic retrograde cannulation of the pancreatic duct was therefore attempted but was unsuccessful due to distortion of the duodenum by extrinsic compression. At laparotomy the liver was found to be enlarged, but there was no evidence of extrahepatic biliary obstruction. A retroperitoneal haematoma was evacuated and a wedge liver biopsy performed. Postoperatively acute renal failure developed, characterised by oliguria and rapidly rising serum creatinine to greater than 500 μmol/l. Haemodialysis was complicated by hypotension. Serum bilirubin reached 600 μmol/l. The patient lost consciousness and required artificial ventilation but despite these measures died 32 days after admission to hospital.

Light microscopy of the operative liver biopsy (Fig 1) confirmed the presence of marked cholestasis, with slight bile duct proliferation. The hepatic architecture

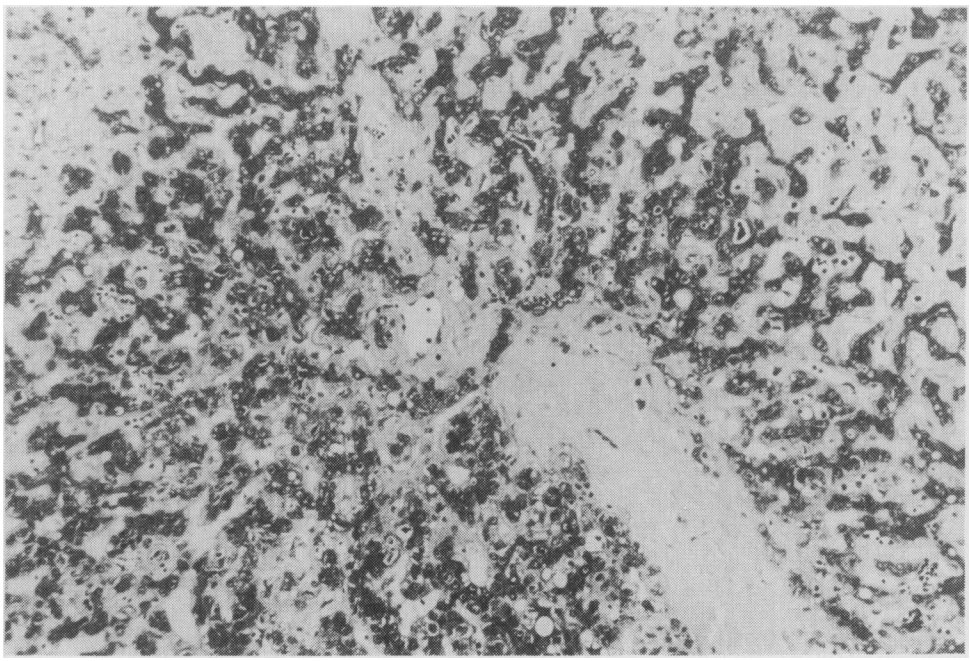

Fig 1. Liver. The architecture is disrupted and the hepatocytes compressed by amorphous material. (Masson trichrome × 100).

was grossly distorted by bands of fibrous tissue but there was no regenerative activity to establish a diagnosis of cirrhosis. The sinusoids and hepatocytes were compressed and the appearances were suggestive of amyloid, but Congo red staining was negative on several occasions. It was felt that extrahepatic biliary obstruction or sclerosing cholangitis could not definitely be excluded on the basis of this wedge biopsy.

At the subsequent necropsy the body was deeply jaundiced. The liver was enlarged, weighing 3150 g. The liver capsule was intact, apart from the sutured biopsy site. It had a finely nodular external and cut surface. The extrahepatic biliary tree was patent, with no evidence of obstruction or dilatation. The pancreas appeared macroscopically normal, with no evidence of tumour. The ampulla was normal. The remains of a retroperitoneal haematoma was present behind the duodenum in close relation to the lower end of the common bile duct. No definite bleeding point could be identified and there was no perforation of the common bile duct or duodenum. The spleen was enlarged, weighing 319 g. It had a slightly firm consistency on cut section.

Histologically the postmortem liver was similar to the biopsy. Sections from both were stained repeatedly with Congo red, Thioflavine T and Sirius red but results were consistently negative. Immunoperoxidase staining of liver for AA amyloid was also negative. Stains for kappa and lambda light chains showed no evidence of light chain restriction. Electron microscopy of the biopsy and postmortem liver showed similar features (Fig 2). There was widespread deposition of extracellular fibrillar material in the perisinusoidal space of Disse and between hepatocytes. This material was composed of aggregates of non-branching fibrils, 9 nm in diameter in a felt-like meshwork. The appearances supported a diagnosis of Congo red negative amyloidosis.

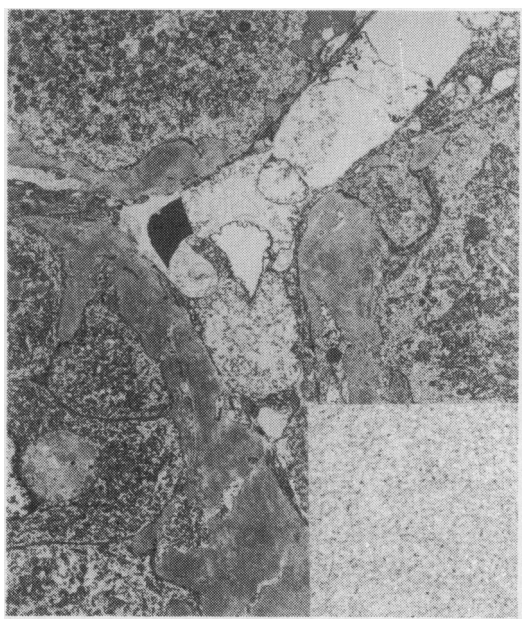

Fig 2. Electron micrograph of liver showing amyloid material lining the space of Disse. (Uranyl acetate, lead citrate × 3500).
Inset: High power of the amyloid fibrils (× 10^5).

Histological examination showed infiltration of multiple organs with amyloid material. The heart, thyroid gland, adrenal glands, pancreas, spleen and kidneys were all involved. The appearances of the kidneys on light microscopy were typical (Fig 3). Amyloid material was noted around renal arterioles, in the interstitium and to a lesser extent, focal glomerular infiltration. The renal tubules showed a significant degree of flattening of the tubular epithelium with tubular dilatation indicative of acute tubular necrosis. In the thyroid gland there was striking separation of the follicles by the amyloid material. Immunoperoxidase

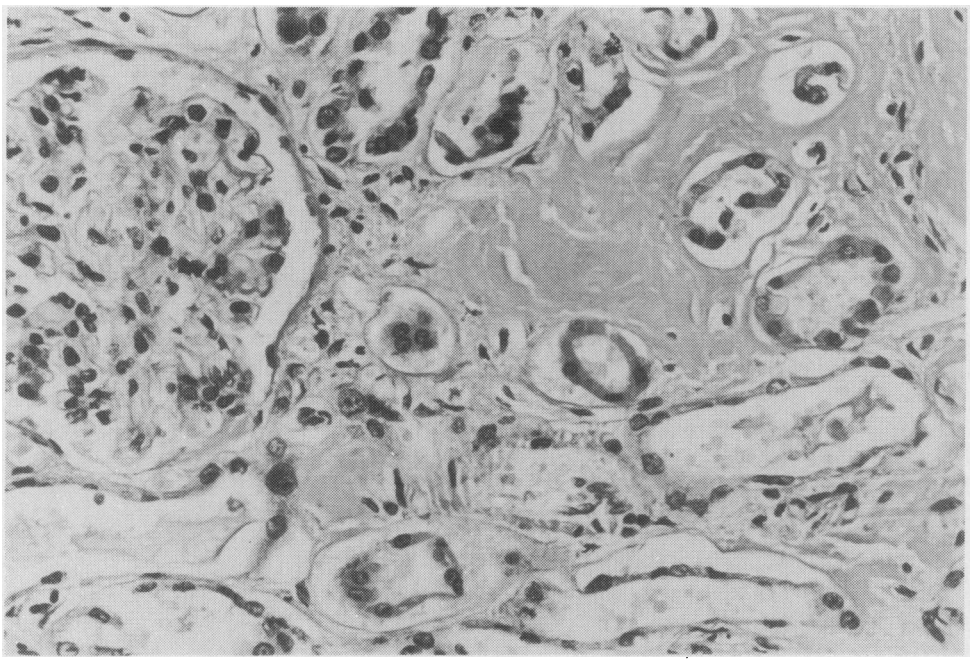

Fig 3. Kidney. There is interstitial deposition of amorphous material which electron microscopic examination confirmed to be amyloid. The appearances in several other organs were similar (see text). (Haematoxylin and eosin × 250).

staining for calcitonin was negative as were the conventional light microscopical stains for amyloid. Involvement of the adrenal glands was confined to the medulla with compression atrophy of the medullary parenchymal cells and a notable sparing of the adrenal cortex. Within the pancreas the ducts and blood vessels were infiltrated by same material. The splenic arterioles were involved along with diffuse infiltration of the splenic red pulp. The heart showed diffuse interstitial infiltration.

DISCUSSION

Although the liver is frequently involved in amyloidosis, obstructive jaundice due to severe intrahepatic cholestasis is a very rare complication. In this case, the cause of the jaundice only became apparent when electron microscopy of liver tissue revealed the ultrastructural appearance of amyloidosis. Oxytetracycline is recognised to cause microvesicular fatty metamorphosis. This complication usually occurs within a few days of starting large doses administered parenterally.[1] It is unlikely that oxytetracycline was the cause of liver dysfunction and withdrawal of the drug on admission to hospital was not associated with any improvement. There was no evidence at autopsy of sclerosing cholangitis, cholangiocarcinoma or drug-induced hepatic injury which had earlier been considered in the differential diagnosis.

There was no clinical or pathological evidence of chronic disease which might have given rise to secondary amyloidosis, and the absence of clinical features of multiple myeloma and the presence of an IgG paraprotein indicate that this was

a case of primary or immunocyte-related (AL) amyloidosis.[2] In these cases the amyloid protein is derived from light chain fragments of immunoglobulins. Primary AL amyloidosis involves the liver in 65–70% of cases,[3] but significant liver dysfunction is very rare and death is usually due to renal insufficiency, cardiac failure or sudden cardiac death.

A recognised subgroup of patients with AL amyloidosis do develop severe intrahepatic cholestasis. Review of the literature reveals 23 previous cases.[4,5] Including this case, there is a majority of males (15:9) and the age range is 29–80 years. The serum bilirubin at presentation was in excess of 300 μmol/l in only six out of the twenty-four cases and a monoclonal paraprotein band was detected in the serum in eight of twelve cases where it was sought. Multiple myeloma was diagnosed in only one case[6] and in one case the M band was due to free lambda light chains. Death was due to renal failure in seventeen of twenty cases where the cause was recorded. Median survival was only 12 weeks (range 3–52 weeks). The cause of cholestasis in this subgroup is unclear. It has been postulated that the pattern of amyloid deposition in these cases interferes with the passage of bile from canaliculi and/or small intrahepatic bile ducts to septal bile ducts.[7] The microscopic findings in our case would support this hypothesis.

This case also illustrates the difficulty which has frequently been encountered in diagnosis. Ultrasound and CT scans are typically non-diagnostic. The negative staining with Congo red and other amyloid stains increased our difficulty. Melato et al noted variable affinity for Congo red in their series of cases of hepatic amyloidosis.[8] We confirm that conventional stains for amyloid may be falsely negative and that electron microscopy is a more sensitive diagnostic technique. The presence of a paraprotein band in a jaundiced patient with no stigmata of chronic liver disease and no radiological evidence of biliary tract obstruction should raise the possibility of hepatic AL amyloidosis. Percutaneous liver biopsy is the procedure of choice to obtain a histological diagnosis.[9] There is some added risk of bleeding complications with invasive procedures, as illustrated by this case, even when the prothrombin time has been corrected, probably as a result of involvement of blood vessels by amyloid.

There is no established effective therapy for primary hepatic amyloidosis. Several authors have reported regression of hepatomegaly following treatment with a combination of melphalan and prednisone.[6, 10, 11, 12, 13] In one case amyloid was present in a liver biopsy specimen before treatment and absent after treatment.[10] Colchicine and dimethylsulphoxide have also been tried[14] but no treatment has been reported to be of benefit in cases of severe cholestasis.[5] The prognosis in such cases is very poor.

We wish to thank Miss Maria McConvey for secretarial assistance.

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Case report

An unclassifiable dermatosis affecting the periorbital areas and neck with lymphadenopathy oedema and pharyngitis

T A J Dawson

Accepted 14 August 1991.

Over the course of some years I have become increasingly aware of seeing a succession of patients with a syndrome consisting of a rash, lymphadenopathy, oedema and pharyngitis which, when it presents in its entirety, is unmistakable, if unclassifiable. Involvement of the periorbital areas and front of the neck is characteristic. Most cases occur in adults though some children have been affected. The sex distribution appears to be equal.

CASE REPORTS

The morphology of the rash is usually that of a psoriasiform eczema, though occasionally tumid papulation can occur. The lesions typically affect the periorbital areas and the front of the neck in a distribution unlike any other dermatosis of which I am aware. Other parts of the body, particularly the limbs can also be involved. Diffuse and quite marked subcutaneous oedema may complicate the rash. The patients usually complain of severe itching. In more cases than one would expect there is a history of, or signs of, a herpes-like skin lesion at about the time of the onset of the disease. Examination frequently reveals a significant asymptomatic lymphadenopathy, usually of the cervical or axillary nodes. The soft palate and uvula may be bright red and slightly oedematous, though surprisingly these changes do not give rise to symptoms. The disease usually runs a course of some months before gradually clearing away, though in some cases it has persisted for more than a year.

Peripheral blood counts, serum IgE determinations, serum α interferon determinations, measurement of herpes simplex and varicella-zoster antibody titres, tests for infectious mononucleosis, examination of smears taken from skin lesions for viral particles by electronmicroscopy, and examination of scales taken from skin lesions for fungi and skin biopsies have been carried out in 20 cases. Minor degrees of eosinophilia were present in eight patients, one other patient had an eosinophilia of $1{\cdot}3 \times 10^9/1$. Slight to moderate elevation of the serum IgE not exceeding 500 mU/l occurred in 10 patients and in two other patients a serum IgE greater than 1000 mU/l was recorded. In one female patient aged 84 years more than 30% of the peripheral lymphocytes were present as Sézary

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cells at the height of the illness; 18 months later she was virtually symptom-free with Sézary cells accounting for less than 5% of the peripheral lymphocytes. No other significant abnormality has been detected.

The figure illustrates the skin lesions as they occurred in a girl aged eight years. In this case there was a history of a flu-like illness in December 1989 followed by a 'cold-sore' to the left of the nose. Shortly after this she developed the rash as shown. The lesions were said to be itchy. There was no history of any previous skin disease. The photograph was taken in February 1990. The lesions cleared away completely over the course of some months. She continued under review and one year later her skin remained healthy with no evidence of any disease.

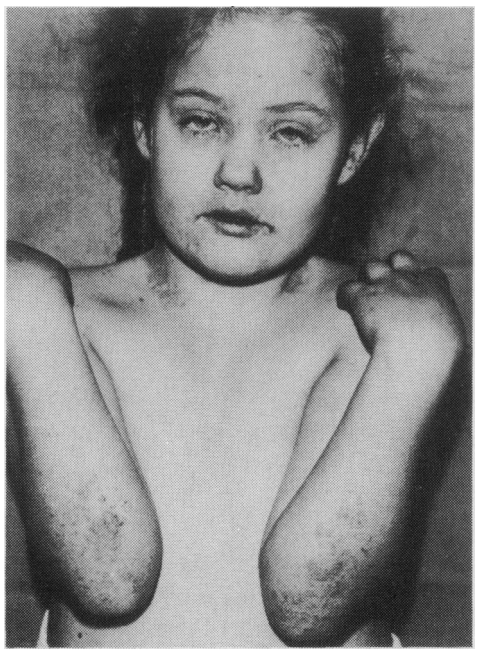

Figure. An eight year old girl affected by the dermatosis. The involvement of the periorbital areas and neck is characteristic.

COMMENT

It seems probable that this syndrome is caused by an infection of some kind which leads to an inappropriate reaction by the immune system. The fact that in more cases than one would expect the onset of the illness is associated with an herpetic lesion, and that an outbreak of atypical shingles occurred in this area about 10 years ago[1] may be significant.

I acknowledge with thanks the assistance of my colleagues in the Departments of Pathology of Craigavon Area Hospital, Belfast City Hospital, the Royal Victoria Hospital, Belfast, and The Queen's University of Belfast; also Ms M H Smith, Senior Medical Photographer, Craigavon Area Hospital.

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Case report

Perforation of the urinary bladder due to prolonged use of an indwelling catheter

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Spontaneous perforation of the urinary bladder occurring in patients with an indwelling catheter is an exceptional event. To our knowledge there are only eight cases in the literature.[1-6] With the exception of one patient,[2] all were over seventy years of age and all but one were male. We present the case of a 76-year-old male who sustained two spontaneous perforations of his urinary bladder within six weeks.

CASE REPORT. A 76-year-old male was admitted within a 10 hour history of abdominal pain. This initially had been sited in the lower abdomen. He had been unwell during the previous week and had vomited several times. His general practitioner treated him for a urinary tract infection on the basis of foul smelling and cloudy urine, and prescribed ciprofloxacin. Two years previously he had suffered a dense left-sided stroke and subsequently became incontinent. He then required long-term catheterisation. On admission he was apyrexic with a tachycardia of 122/min, BP 120/90 mmHg and respiratory rate 22/min. There was suprapubic tenderness and guarding but no rebound. Bowel sounds were present. Rectal examination revealed a large smooth prostate. There was a silastic Foley-type urinary catheter in place with urine in the attached bag. Investigations revealed blood levels of Hb 13·9 g/dl, WCC 19·1 $\times$ 10^9/l, urea 19·2 mmols/l, sodium 137 mmols/l, potassium 5·8 mmols/l and amylase 20 U/l. X-rays of abdomen and chest revealed several fluid levels but no free gas.

After two hours he became very distressed and developed a rigid abdomen. He was taken to theatre after resuscitation and through a lower midline incision a 5 mm perforation was found in the dome of the bladder with the catheter protruding. The bladder wall was generally thickened. One litre of purulent straw-coloured fluid was aspirated from the peritoneal cavity. There was also a Meckel's

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diverticulum. Biopsies were taken of the bladder; macroscopically it appeared normal. A fresh catheter was inserted prior to closure of the defect. The perforation was repaired in two layers with 2/0 chromic catgut. The peritoneal cavity was washed out with saline and a tube drain placed in the pelvis. The postoperative course was uneventful. Histological report was returned as heavily inflamed granulation tissue with some fragments of muscle denuded of epithelium. There was no evidence of malignancy or acid-fast disease.

Six weeks later he presented again with abdominal pain and a rigid abdomen, with absent bowel sounds. Blood examination showed Hb 13·3 g/dl, WCC 19·7 × 10^9/l, and amylase 35 U/l. Blood urea and electrolyte levels were normal, as were his X-rays. At operation it was found that he had again perforated, at the same site. This was repaired in two layers with 2/0 polyglactin. Biopsies were not taken, and recovery was uneventful. Cystoscopy performed two months after operation showed large occlusive lateral and median lobes of the prostate. There was bladder trabeculation, with a diverticulum inferior to a catheter mark on the dome. Biopsy of the diverticulum showed increased layering of the epithelium with submucosal oedema but no malignancy. To date there have not been any further urinary problems.

DISCUSSION

The reasons for catheterisation in the previously reported cases in the literature were incontinence secondary to cerebrovascular disease, or difficulty with micturition due to benign prostatic hypertrophy. The time scale from insertion of the catheter to perforation varied from eight months to two years. The reported mortality rate is 40% due to associated risk factors such as cardiac disease. The diagnosis was not made preoperatively in any of the cases, including our own. The failure to pass urine can be due to hypovolaemia alone, and even if the bladder is ruptured, urine is often present in the urine bag on admission. Further, there are no pathognomonic early indications of bladder rupture.

It has been shown experimentally that it is the negative pressure exerted by the undrained column of urine in the drainage tubing that sucks the bladder mucosa into the proximal orifices of the catheter and causes the formation of haemorrhagic pseudopolyps.[5] This effect may even occur within 10 minutes of catheter insertion. It is not seen when measures are undertaken to prevent this column forming (such as the use of a wide-bore tube). In all but one case the perforation was sited in the dome of the bladder (the exception being the dorsal aspect of the left side). The usual histological findings are those of chronic inflammation, sometimes with loss of mucosa. Most histological reports did not find evidence of haemorrhagic pseudopolyps. The cause of the second perforation in our patient is most likely related to the previous repair. Bjerre reported a similar finding in a 70-year-old male who had a bladder resection for carcinoma and subsequently suffered perforation by an indwelling catheter six days after his operation.[7]

Prevention of this complication would require abolition of the disease responsible for the presence of the catheter in the first place, but this is not always possible. Intermittent catheterisation has been suggested, but this requires a degree of dexterity not usually seen in this age group. A high index of suspicion is required to diagnose perforation of the urinary bladder.

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Case report

Toxic elevation of serum lithium concentration by non-steroidal anti-inflammatory drugs

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It is estimated that four million people in the United Kingdom have either osteo-arthritis or rheumatoid arthritis. With the extension in lifespan seen in recent decades, the number is thought to be increasing. Many of the above will be treated with non-steroidal anti-inflammatory drugs.

Lithium has been proven to be useful in the prophylaxis of affective disorders. It is also used in refractory depression and mania and has been advocated in those with aggressive outbursts. McCreadie et al[1] found it being taken by 0·77/1,000 people in south west Scotland. Extrapolated to the United Kingdom this would mean lithium is taken by approximately 40,000 patients.

With the increasing use of non-steroidal anti-inflammatory drugs and lithium, the possibility of interactions are more likely. Seven reports of patients taking both agents detail interactions leading to a toxic elevation of the serum lithium level. The non-steroidal anti-inflammatory drugs previously implicated have been piroxicam,[2, 3, 4] mefanamic acid,[5, 6] indomethacin[7] and phenylbutazone.[8] We have recently observed two patients with affective disorders who were maintained on lithium carbonate but then developed lithium toxicity following inadvertent prescription of non-steroidal anti-inflammatory drugs by their general practitioner.

REPORTS

CASE 1. A 73-year-old widow had been suffering from annual episodes of endogenous depression for five years. She had previously responded to tricyclic anti-depressants and electroconvulsive therapy. Her physical health had been excellent except for menorrhagia which required hysterectomy at age 52, and osteo-arthritis. She had no renal or hepatic impairment and was on no medication except that for her psychiatric condition. Maintenance treatment with anti-depressant drugs proved unsatisfactory because of tremor and tinnitus. Lithium carbonate (Priadel, Delandale) 400 mg at night was commenced in July, 1987.

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At this dose she achieved serum lithium concentrations in the range 0·5–0·6 mmol/l and remained clinically euthymic. In March, 1988 her serum lithium was found to be 1·15 mmol/l, an increase from 0·5 mmol/l one month previously, and she suffered increasing coarse tremor. No other symptoms of toxicity were noted. Analysis of full blood count, liver function tests and serum urea, electrolytes and creatinine were essentially unchanged, and were within the normal laboratory range. There was no clinical or laboratory evidence of urinary tract infection. She denied altering her medication at any time. Lithium dosage was reduced to 200 mg at night and serum lithium concentration fell to 0·3 mmol/l in May, 1988. It was not until this visit to the clinic that she mentioned she had been commenced on piroxicam (Feldene, Pfizer) 20 mg daily in February, 1988, by her general practitioner, for arthritis in her shoulder. Her discomfort had settled and she had stopped the piroxicam prior to the May visit. The lithium was increased to 400 mg at night again and her serum lithium concentration now remains stable at 0·5–0·7 mmol/l.

CASE 2. A 53-year-old lady with a history of severe bipolar affective disorder over 35 years was attending as a day patient after a nine month admission with mania. She had suffered from infective hepatitis while in Africa 15 years previously, and had been overweight for some years which contributed to her osteo-arthritis. She had become hypothyroid as a result of lithium therapy. Her clinical state was stable on lithium carbonate (Priadel, Delandale) 400 mg twice daily, pimozide (Orap, Janssen) 12 mg four times daily, ibuprofen 400 mg three times daily and thyroxine 50 mcg daily. She used no other medications. Episodically she would complain of unsteadiness and tremor. On these occasions her serum lithium concentration, which was usually in the range 0·7–0·9 mmol/l, would be above 1·2 mmol/l. Initially it was felt this might be related to erratic use of her medication. Serum urea, electrolytes, creatinine and liver function tests had been stable over several years and remained within normal laboratory values despite fluctuating serum lithium levels. There was no clinical or laboratory evidence of salt or water depletion. Though the dose of neuroleptic was high, this had been found necessary to control her illness and her tremor was not parkinsonian. It was decided to give out her tablets on a daily rather than a weekly basis, but despite this her serum lithium concentration rose from 0·9 mmol/l (on 7.9.87) to 1·5 mmol/l (on 23.10.87). We then suspected that varying use of ibuprofen was causing these fluctuations. Her serum lithium was stabilised at 0·7 mmol/l on 400 mg lithium carbonate per day. Withdrawal of ibuprofen was then followed by a fall in serum lithium to 0·4 mmol/l after one week, and re-introduction was followed by a rise of serum lithium to 0·7 mmol/l.

DISCUSSION

Lithium carbonate is an effective compound in the prophylaxis of unipolar and bipolar affective disorders but it has a narrow therapeutic index and drug interactions can cause fatalities. It is now clear but perhaps not widely recognised that some non-steroidal anti-inflammatory drugs can elevate serum lithium concentrations into the toxic range and this report adds ibuprofen to the list. Even patients maintained at the lower end of the therapeutic range for serum lithium may present with toxic symptoms or fluctuating lithium concentrations. Given the increasing use of lithium carbonate for recurrent affective disorder in older

patients, who are more likely to be prescribed non-steroidal anti-inflammatory drugs, this interaction requires greater attention. Furthermore it is particularly general practitioners who need to be aware of this as it is they, rather than the psychiatrist, who are most likely to prescribe one of these analgesic agents for a transient or newly emergent inflammatory problem. Our first case in particular highlights this problem, and the patient developed signs of toxicity that continued for some time before the next appointment at the hospital. We would advise all doctors to consult the relevant section on drug interactions in the British National Formulary before prescribing any adjunctive medication to a patient on lithium.

Certain drugs, such as piroxicam, may be more potent than others. The mode of interaction is unclear but may be related to renal prostaglandin function.[6, 8] Non-steroidal anti-inflammatory agents act to reduce prostaglandin synthesis, by inhibiting the cyclo-oxygenase enzyme system. Sodium excretion is subsequently reduced in the kidney and this lowers lithium clearance.[9] Other non-steroidal anti-inflammatory drugs implicated also have powerful prostaglandin inhibitory action.[10] The implication of ibuprofen, which is now available without prescription, leads to further concern.

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Case report

Basal cell carcinoma presenting with profound anaemia

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Dermatological malignancy is the commonest form of cancer in the United Kingdom.[1] Basal cell carcinoma accounts for approximately 80% of all non-melanocytic tumours, with a similar percentage affecting the head and neck.[2] Tumour growth patterns are variable in this condition,[3] with most interest focusing on 'rodent ulcers' affecting the head and neck. Little is known about the inherent biological behaviour of truncal basaliomas.[4] We present a case of a giant exophytic basal cell carcinoma affecting the trunk, which presented with profound anaemia and generalised debility.

CASE REPORT. A 50-year-old male was referred to our surgical unit with a tumour mass on the left anterolateral chest wall which had been present for at least 12 years. For two months prior to this, bleeding and a foul smell from the lesion had caused him social embarrassment. He also complained of extreme lassitude, palpitations, dyspnoea on exertion; he had lost two stones in weight, despite having a normal appetite and well-balanced diet. On examination the patient was pyrexic (38·5°C) and had signs of marked weight loss and of anaemia. He had sinus tachycardia, but no sign of cardiac or respiratory embarrassment. There was a mobile, ulcerated exophytic tumour 15 × 15 cm on his left anterior chest wall (Figure), which was superficially necrotic, ulcerated and bleeding. There was no evidence of regional lymphadenopathy or systemic dissemination of this tumour. The patient was of retiring disposition and reluctant to volunteer information. His affect was consistently incongruous; however, when challenged he admitted to having a deep-seated fear of cancer. Bacterial swabs grew a heavy mixed population of *E. Coli, pseudomonas* and *bacteroides spp.* Haematological investigation confirmed a microcytic anaemia (Hb 7·0 g/dl, MCV 64·4 fl, MCHC 27 g/dl, WCC 4·5 × 10^9/l, platelets 408 × 10^9/l) and hypoalbuminaemia (19 g/dl) with a rise in the serum globulin fraction to 49 g/dl (normal range 20–37). The ESR was 85 mm/hr. Radiological investigations were within normal limits.

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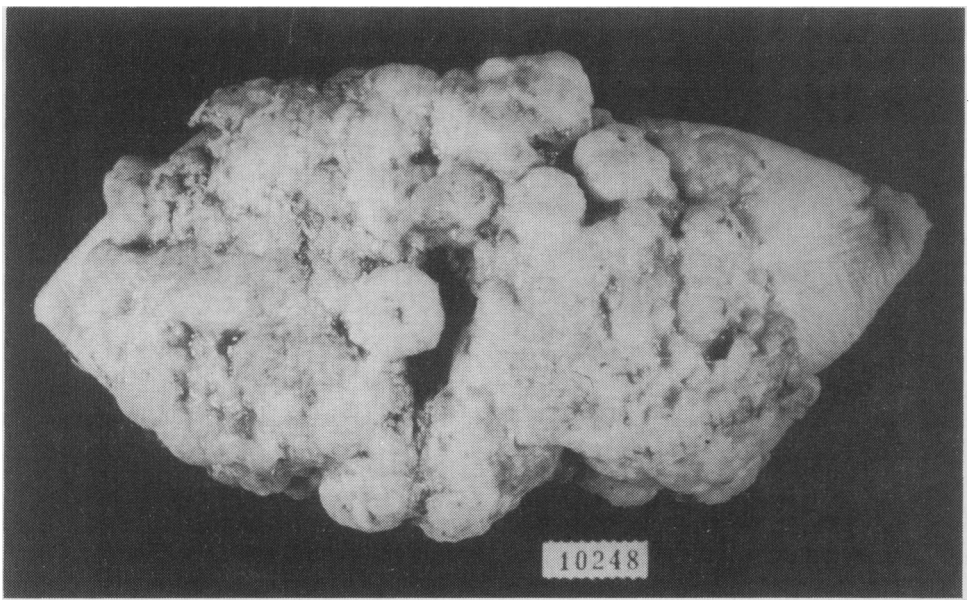

Figure. Tumour mass removed from the chest wall.

The tumour was widely excised and a split skin graft applied to the defect. He made an uncomplicated postoperative recovery and was discharged after ten days. At follow-up his condition had improved, he had recovered one stone in weight; all haematological parameters had returned to normal one year post-operatively. Histopathological analysis revealed a giant exophytic basal cell carcinoma with no evidence of malignant squamous elements. The lesion had been entirely excised with clear margins and there was no evidence of invasion beyond the interface of the reticular dermis and subcutis. Despite a very mature blood supply, areas of this tumour were necrotic and heavily contaminated.

DISCUSSION

Only 4% of all basal cell carcinomas occur on the trunk,[2] most being superficially erosive in character.[5] The disease process is usually terminated in the early stages[6] and it is rare nowadays to see the complete natural history. Over 200 cases of metastasising basal cell carcinomas have been reported to date, and of these 16·5% were primary truncal.[7] It is generally felt that metastatic basal cell carcinomas originate from large tumours present for may years.[8]

Giant exophytic basal cell carcinomas are very uncommon. No other cases presenting with anaemia have been recorded. Controversy remains over the malignant potential and immunological effects seen in this type of lesion.[4] In the present case, which was allowed to follow its natural course for over 12 years, we could detect no evidence of metastatic spread, despite the obvious systemic effects of the tumour through anaemia and debilitating chronic sepsis.

The lesion had ulcerated and bled persistently for two months prior to admission. Although blood loss was the most likely cause of the anaemia, it is possible that chronic sepsis with bone marrow suppression and non-metastatic biological

effects of the tumour may have contributed to its development. These secondary sequelae were clinically misleading and consequently did not reflect the indolent neoplastic potential of this lesion.

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Case report

Hiccups and oesophageal malignancy

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A patient presenting with dysphagia will usually undergo vigorous investigation to identify the structural or motor disorder responsible. The phenomenon of hiccups more commonly elicits amusement or annoyance than the pressure to investigate intensively. We present the case of a patient in whom hiccup was the sole presenting symptom of oesophageal carcinoma.

CASE REPORT. A 46-year-old man presented with a three month history of hiccup, occurring almost daily but associated only with the swallowing of solid food. It usually settled with a glass of water, the longest attack lasting almost thirty minutes. Indeed, it was this attack which precipitated his referral. On careful questioning at the time and retrospectively, he denied any dysphagia whatsoever. There was no weight loss and appetite was good. There was no history of regurgitation. He had no respiratory symptoms but was a smoker of eight cigarettes daily. His previous medical history included an episode of concussion following a road accident two years previously and an episode of suspected renal colic.

Oesophago-gastroscopy showed an non-ulcerated hyperaemic vertical ridge just above the oesophago-gastric junction. On the retroverted view of the cardia, no abnormality was apparent. Biopsies of the ridge tissue showed an adenocarcinoma. He subsequently underwent oesophago-gastrectomy. There was no evidence of involvement of the diaphragm although three adjacent lymph nodes were shown histologically to be involved by the tumour. Symptomatically he remains well sixteen months after his operation.

DISCUSSION

The symptom of hiccup (singultus) is usually transient and merely a trivial annoyance in most cases. As exemplified in this case, persistent or recurrent hiccups may herald serious pathology. The hiccup reflex has no apparent function and is produced by the sudden involuntary contraction of the diaphragm and external intercostal muscles against a closed glottis. The mechanism involves afferent fibres in the vagus and phrenic nerves, a brainstem hiccup centre and efferent fibres through the phrenic, vagus, cervical and thoracic nerves.[1] Hiccups may

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result from vagal or phrenic nerve stimulation which may be local as in peritonitis or a diaphragmatic tumour,[2] or from metabolic or neurological disorders.[3] Oesophageal disorders which may produce hiccups include gastro-oesophageal reflux,[4] pill induced oesophageal injury[5] and benign oesophageal stricture.[6]

In our patient, we presume that the hiccup was caused by oesophageal distension from an arrested food bolus acting as an afferent vagal stimulus, although associated dysmotility may have contributed. Whilst oesophageal malignancy may produce hiccups in conjunction with dysphagia,[6] we have been unable to locate any cases in the medical literature where it was the sole presenting symptom.

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Case report

Massive tissue necrosis can be induced by heparin or warfarin

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Massive skin and soft tissue necrosis is a rare but potentially fatal complication of warfarin therapy in 0·01 to 0·1% of patients receiving the drug,[1] but is not usually associated with heparin therapy unless limited to the site of subcutaneous injection.[2] In warfarin therapy, the aetiology of this complication remains unknown but has been associated with the protein C/protein S system. Protein C and protein S are naturally occurring vitamin K dependent plasma proteins which regulate blood coagulation. Deficiencies of one or other, whether acquired or hereditary, have been associated with spontaneous clinical thrombosis.[3] Where anticoagulation is required in the presence of protein C deficiency, heparin has been recommended as an alternative, which may also arrest the progression to frank necrosis.[4] We report two cases in which massive necrosis of skin and soft tissue was induced, in one case by heparin and in the other by warfarin. We speculate on a possible common aetiology which may limit the use of heparin as an alternative to warfarin in some patients.

CASE HISTORIES

Case 1. A 55-year-old caucasian female was admitted with an exacerbation of ulcerative colitis which she had suffered for 4 years. She was treated with corticosteroids (but with no other drugs known to have a haemorrhagic potential), and developed deep venous thrombosis for which intravenous heparin was given. Warfarin was not administered. After seven days, in which adequate control of anticoagulation had been maintained, she developed painful skin discoloration in both breasts, whereupon the heparin was discontinued; despite this the skin underwent necrosis. On transfer to the Plastic Surgery Unit she was toxic and febrile. At surgery the left breast was found to be completely necrotic with gas bubbles in the pectoralis muscles (Fig 1) and mastectomy was required. The right breast was less severely affected, requiring local débridement only. The wounds were left open but subsequently covered with split skin graft on the left and directly closed on the right. Pre- and postoperative coagulation screens were within normal limits; there was no evidence of thrombocytopenia. Histology of

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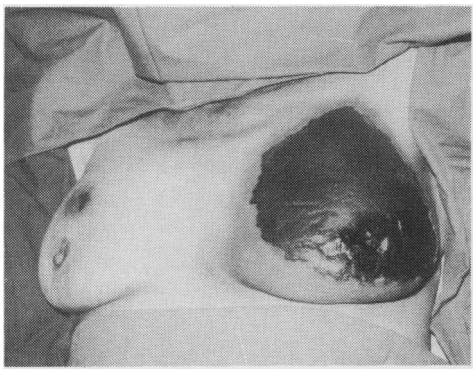

Fig 1. Case 1. Preoperative chest wall.

the specimens showed haemorrhagic necrosis of skin and soft tissue with no evidence of pyoderma gangrenosum or malignancy. *Staphylococcus aureus* and *streptococcus fragilis* were cultured but no *clostridia.* The patient made an uneventful recovery.

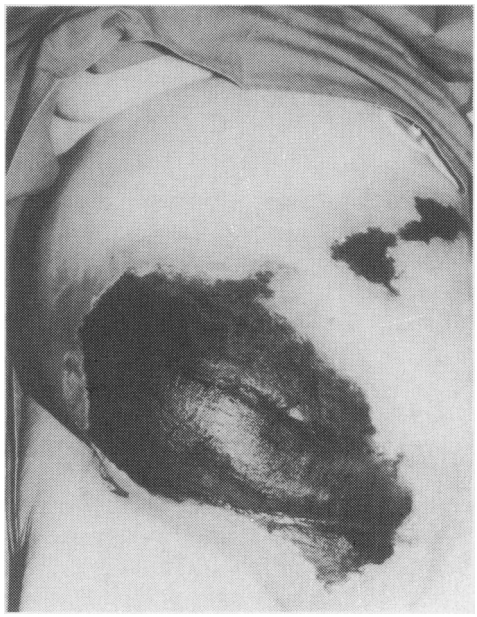

Fig 2. Case 2. Preoperative abdominal wall.

Case 2. A 68-year-old obese caucasian female in atrial fibrillation underwent successful femoral embolectomy for acute arterial occlusion. She was initially anticoagulated with intravenous heparin and commenced on warfarin. After 5 days she developed painful skin discoloration over the lower abdomen, whereupon warfarin was discontinued. The skin subsequently became necrotic (Fig 2). On transfer to the Plastic Surgery Unit her anticoagulation screen was normal, and there was no evidence of thrombocytopenia. At surgery the skin and soft tissue of the anterior abdominal wall were found to be necrotic and required débridement to the level of fascia over the musculature. The wound was left open but subsequently covered with split skin graft. Histology of the specimen showed haemorrhagic necrosis of skin and soft tissue from which staphylococci and coliforms were cultured. The patient made an uneventful recovery.

DISCUSSION

Heparin and warfarin are important therapeutic agents but have a number of recognised adverse effects.[5] Massive skin and soft tissue necrosis induced by warfarin anticoagulation, though rare, is well documented. Although the aetiology of this complication remains unknown, a direct toxic effect, hypersensitivity and thrombosis related to vasculitis and deficiency of protein C have been suggested.[1] An acquired deficiency of the protein C/protein S system, a similar deficiency inherited in autosomal dominant or recessive fashion, the absence of thrombocytopenia or concurrent medication which may contribute to enhanced bleeding, should result in thrombosis. Both our cases demonstrate haemorrhagic changes only. Where the microscopic appearances are that of thrombosis, it has been suggested that heparin may be indicated as an alternative agent, which may also arrest the progression to frank necrosis.[2] We report here (Case 1) heparin-induced

massive skin and soft tissue necrosis seen previously only as a complication of warfarin therapy. Interestingly, our patient had ulcerative colitis. This disease may be relevant, as its autoimmune nature results in thrombo-embolism. We can find no reference in the literature to deficiencies in the protein C/protein S system in patients with this disease, but the changes that occur are known to result in thrombosis rather than haemorrhage. In addition, this patient was on maintenance dose of corticosteroids, which are associated with an increased tendency to bleed in the presence of heparin, although it is unlikely that this would be sufficient to cause the degree and localization of necrosis in the breast. *Clostridia* and other gram positive organisms are known to cause tissue necrosis but their absence in either of these cases makes this explanation unlikely. Skin necrosis may occur with heparin therapy as a complication of thrombocytopenia or may be localized to the site of subcutaneous injection, and may be medicated by IgG.[2,6] We would suggest that the postulated mediators in warfarin-induced necrosis may be related to the inflammatory and immunological mediators involved in heparin-induced complications. Thus, in those patients who require continued anti-coagulation in the presence of warfarin-induced skin or soft tissue necrosis and who also have an autoimmune disease or are at risk of generalized thrombo-embolic phenomenon, heparin may not be an appropriate alternative agent. However, the new low molecular weight heparins may offer such an alternative and could be given as a trial subcutaneous dose which would produce an immediate localized reaction in the small number of patients who are truly hypersensitive to heparin, which remains a possible explanation for the massive necrosis in our cases.

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Case report

Solitary multilocular cyst of the kidney — a diagnostic problem

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Benign multilocular cystic nephroma is a rare condition of the kidney, first described in the literature by Edmunds in 1892.[1] The terminology is a confusing issue and the name has many synonyms, the most popular being multilocular cyst of the kidney. Preoperatively this diagnosis is difficult to make even with today's sophisticated diagnostic techniques, and this case highlights that problem.

CASE HISTORY. A 58-year-old woman presented after having taken an overdose of paracetamol. During routine physical examination a non-tender mass was noted in the right outer quadrant of her abdomen. She previously had surgery for repair of a perforated duodenal ulcer, a left mastectomy for infiltrating ductal carcinoma, and a tympanoplasty for cholesteatoma. She also suffered from depressive neurosis and diverticular disease of the colon. She had no family history of renal disorder. She was normotensive and routine blood investigations were normal. Mid-stream urine sample revealed asymptomatic infection with *Escherichia coli.*

Ultrasound scan revealed a 6 × 7 cm cystic lesion in the lower pole of the right kidney. Some distortion of the mid and lower pole calyceal systems was noted on intravenous urography; the left renal tract was normal. CT scan revealed a mixed cystic and solid lesion of the right kidney, a distended gall bladder, a dilated common bile duct and compression of the duodenum. There was loss of the tissue plane between the structures, giving an impression of invasion (Fig 1). Barium meal demonstrated irregularity of the second and third part of the duodenum in keeping with an invasive nature of the tumour observed on CT scanning.

The initial diagnosis after these investigations was of a malignant renal neoplasm; no secondary spread was demonstrable on chest X-ray, liver or bone scan. Operation was performed through a right paramedian transperitoneal

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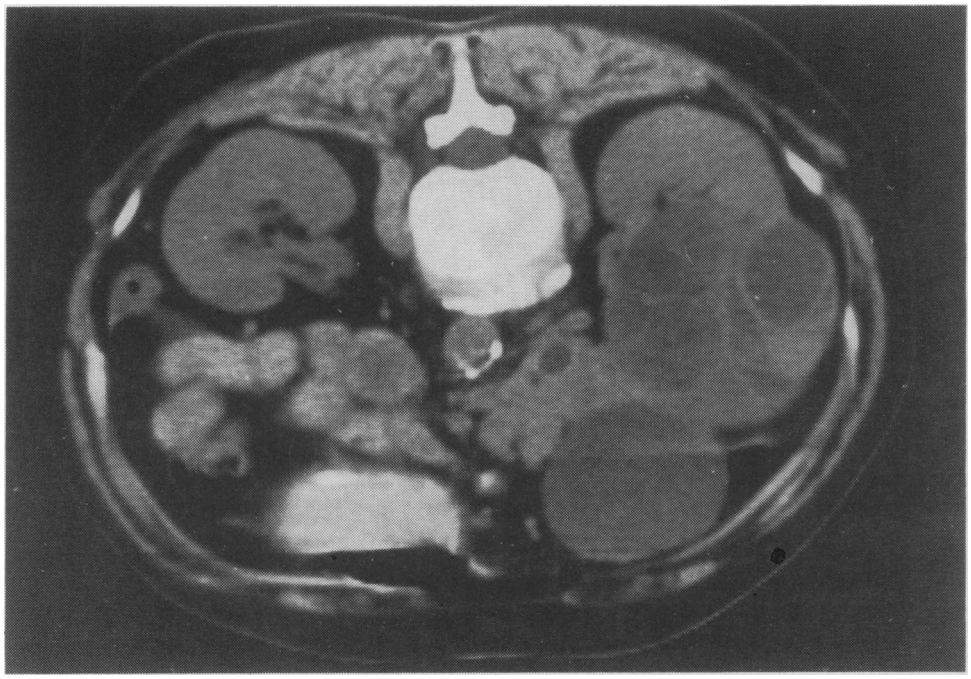

Fig 1. CT scan showing a large cystic lesion attached to the right kidney and suggesting invasion of neighbouring structures.

approach. The lesion was a well circumscribed cystic mass and there was no evidence of invasion of the adjacent organs. Routine nephrectomy was performed. The 13 × 8 × 5 cm kidney weighed 470 gm. A well circumscribed multiloculated cystic lesion occupied the lower pole, impinging on the calyceal system. The cut surface revealed many locules filled with straw coloured fluid. There was no communication with the pelvis (Fig 2). Histologically the lesion comprised individual cysts lined by flat attenuated epithelium. The septae between the cysts were composed of nondescript cellular mesenchyme and hyalinised collagenous tissue. There was a distinct surrounding fibrous capsule which separated the lesion from the underlying compressed renal parenchyma. The renal vein and ureter were normal.

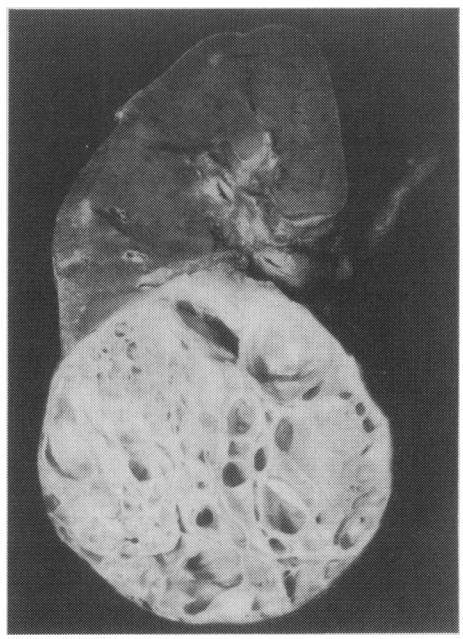

Fig 2. Well delineated multiloculated cyst occupying one pole of the right kidney.

DISCUSSION

Benign multilocular cystic nephroma, although a rare entity in the literature, is now more often recognised. The diagnosis is made using the eight criteria set down by Powell et al,[2] later modified by Boggs and Kimmelstiel.[3] These are — 1) the lesion should be unilateral, 2) it should be solitary, 3) it should be multilocular, 4) the cyst should not communicate with the renal pelvis, 5) the loculi should not communicate with one another, 6) the loculi should be lined with epithelium, 7) fully developed nephrons should be absent from the septa of the cyst and 8) the remaining kidney tissue should be normal. This case satisfies all these criteria. The terms used for this tumour are many and include cystadenoma, cystic renal harmatoma, polycystic Wilms'tumour and cystic nephroma.

The exact pathogenesis is unknown, various authors proposing different theories. Meland and Braasch[4] support a congenital or developmental origin, whereas Christ[5] suggests a neoplastic one. Baldauf[6] claims a multifactorial cause. Others consider it to be a harmatoma[7,8] while many like Boggs and Kimmelstiel[3] believe that it is a benign neoplasia arising from metanephric blastema. The commonest mode of presentation is with a mass in the abdomen, but patients may present with pain, haematuria or infection. There are no systemic effects associated with the lesion, in contrast to polycystic kidneys, although there have been cases of patients with hypertension becoming normotensive following removal of the lesion.[7] Total nephrectomy is commonly resorted to because the lesion is difficult to diagnose preoperatively.[9,10] Ultrasound and CT scans are helpful[7,10] but as demonstrated here, are by no means completely reliable. Simple deroofing may be followed by a recurrence,[11] but partial nephrectomy has been performed with success.[9]

We thank the photographic department of Craigavon Area Hospital and the histopathology department of the Belfast City Hospital.

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Case report

Pseudothrombocytopenia — a cautionary tale

P Kettle, T C M Morris, C Bharucha

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Multichannel electronic cell counters are now in widespread use in haematology laboratories. Platelet counts are given routinely by many instruments and low platelet counts generate much further investigation. A falsely low platelet count may expose the patient to unnecessary and expensive investigation and treatment, and we report two illustrative cases. The platelet counts were performed on blood anticoagulated with ethylene diamine tetra acetate (EDTA) using a Coulter S Plus IV analyser. Blood anticoagulated with 3·8% acid citrate dextrose was analysed simultaneously. In the second case, platelet counts were also performed on heparinised blood.

CASE 1. A 29-year-old primigravid female in good general health was referred for haematological assessment during the first trimester of pregnancy. Her platelet count has been reported as 18 × 10^9/l on two occasions (normal 150–400 × 10^9/l. There was no history of a bleeding tendency and examination revealed no abnormalities, in particular there was no purpura or bruising. The platelet count was rechecked using EDTA (20 × 10^9/l) and citrate (30 × 10^9/l). Other blood parameters were normal. Platelet antibodies were not detected. Bone marrow aspirate and trephine biopsy were normal. A diagnosis of idiopathic thrombocytopenic purpura was made and therapy with prednisolone 60 mg per day was started but there was no rise in the platelet count. A five day course of intravenous immunoglobulin [400 kg/day] was given, also without effect.

Pregnancy proceeded normally, the steroid dosage being gradually reduced and at full term a normal girl was delivered. One month post partum the mother's platelet count was 18 × 10^9/l in EDTA and 194 × 10^9/l in citrate. Three months post partum her platelet count was 76 × 10^9/l in EDTA and 253 × 10^9/l in citrate.

CASE 2. A 29-year-old male was referred for investigation of an incidental finding of thrombocytopenia. Platelet count ranged between 25 and 83 × 10^9/l (all in EDTA). He felt well with no evidence of purpura or bruising. All other

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haematological and biochemical parameters were within normal limits. Platelet antibodies were not detected. Bone marrow aspirate showed numerous megakaryocytes and a diagnosis of idiopathic thrombocytopenic purpura was made. He was treated with prednisolone 60 mg/day for 10 days subsequently reducing to 40 mg daily. After 14 days the platelet count remained 76 $\times 10^9$/1. Prednisolone was reduced to 30 mg/day. Steroid dosage reduction continued and vitamin C 2 g daily was started. Six weeks later prednisolone was discontinued but the platelet count remained 78 $\times 10^9$/1. He was advised to avoid contact sports and to continue vitamin C 2 g daily.

At review three months later his platelet count in EDTA remained 30 $\times 10^9$/1. There was no evidence of excessive bruising. Two courses of intravenous immunoglobulin, 90g/day for two days and 35g/day for five days were given without benefit. Consideration was being given to splenectomy because of the failure to respond to steroids and immunoglobulin. Viral studies were unhelpful.

At this stage the platelet count was checked in citrate, (34 $\times 10^9$/1) and heparin (154 $\times 10^9$/1). Examination of a peripheral blood film showed adequate numbers of platelets. A diagnosis of pseudothrombocytopenia was made and all medication stopped. On two subsequent occasions the platelet count remained low in EDTA and citrate but normal in heparin.

DISCUSSION

Both these cases were initially diagnosed to have idiopathic thrombocytopenia, but it later became clear that the haematological reports represented a pseudothrombocytopenic state. This is an *in vitro* artefact with no clinical effect. In a large survey Vicari[1] found an incidence of pseudothrombocytopenia of 0·13% in 33,623 subjects referred from a general hospital. The commonest cause of this artefact is platelet clumping in EDTA. This is thought to be due to the reaction of platelet specific antibodies with platelets in the presence of EDTA.[2] Van Vliet[3] has shown the presence of an IgM autoantibody in these patients which reacts with the GpIIb/IIIa complex on the platelet surface in the presence of EDTA. Platelet aggregation in citrate has also been described.[4, 5]

In Case 1 the platelet count in citrate was normal after pregnancy, but low during pregnancy. There are two possible explanations for this — either the platelet count during pregnancy was incorrect [due to technical factors such as insufficient citrate in the bottle or small clots being present] or else the platelet autoantibody was active in citrate during pregnancy only. In either case an earlier recognition of this artefact would have spared the patient unnecessary, expensive and possibly hazardous therapy. There are reports of patients with pseudothrombocytopenia having splenectomy for a misdiagnosis of idiopathic thrombocytopenic purpura.[4] It is essential therefore to be sceptical about platelet counts that do not correlate with the clinical history and findings. Most cases of pseudothrombocytopenia will be uncovered if a well-made peripheral blood smear is examined to see if the number of platelets present in the film correlates with the stated platelet count. In pseudothrombocytopenia platelet clumps will be seen if a film is made from blood exposed to EDTA. It is also useful to measure platelet counts in both EDTA and citrate samples simultaneously, as this will usually, but not always, (as in Case 2) raise the suspicion. The latter case demonstrated clumping in citrate as

well as EDTA, and a true platelet count could only be obtained from a heparinised sample. It is now routine practice in this laboratory to recheck all low platelet counts in heparin as well as citrate.

Both cases illustrate the importance of assessing the patient clinically. Neither patient had evidence of bleeding. Asymptomatic patients should not be treated aggressively with steroids or immunoglobulin. One should treat the patient and not the platelet count.

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The Ulster Medical Journal, Volume 60, No. 2, pp. 257–258, October 1991.

Book reviews

Hither and thither; gleanings from my anecdotage. By R W M Strain. (pp 31. £2.50). Cornwall: RWM Strain, 1991. (Available for purchase at the University Bookshop, University Road, Belfast).

Bill Strain's *Belfast and its Charitable Society*[1] established him as more than just a doctor who indulged an interest in local history. The book (based on his 1955 Queen's PhD thesis) was well-researched, well-written and well-received; an important contribution to the history of Belfast. Three later articles, based on impeccably compiled addresses to the Ulster Medical Society respectively charted the Society's history,[2] extended our knowledge of the origins of Belfast medicine[3] and drew charming yet candid *vignettes* of past and present residents (mostly medical) of University Square[4] where Strain himself had lived — in No 3 (1907–8), No 9 (1913–47) and No 8 (1947–54). In retirement (in Cornwall, now Cheltenham) as is natural he turned increasingly to retrospect and in 1982 published a short collection of reminiscences of his medical training[5] which gracefully harnassed a lucid memory to incisive observation to provide telling *cameos* of contemporaries and a strong whiff of what being a medical student was then like. Now at the age of 84 he explores in this extended pamphlet further crannies from his student days and adds experiences from his graduate training, the wartime RAMC, and his tenure of the Queen's ceremonial office of Esquire Bedell.

Not all histories are adept at breathing life into their characters or narrative. Works like the present one, though not themselves 'history', can help them to do so. They have an added bonus — they are easily readable; and a debit — since the characters and their stage are local, the play is mainly for locals, in this case Queen's medical graduates. Wider interest can only be attracted if the characters also bestrode a larger stage — Queen's medical worthies of the period did not, however, although they dominated the local one; if the play itself has some uniqueness — it does not, Strain's experiences have many parallels elsewhere; or if the script (or author) is of especial distinction.

Certainly for years Bill Strain graced the local medical scene and professionally had a wider reputation (he wrote a useful text book for dental students),[6] and unites with style and clarity avoiding the Scylla of banality and the Charybdis of nostalgic sentimentality, and the autobiographical mirror accurately reflects a delightful, loyal, and cheerful colleague, but his subsidiary title "Gleanings from my anecdotage" though unduly self-critical, is not chosen altogether frivolously. This pamphlet will deservedly delight mainly Queen's medical graduates of all vintages to whom I recommend it and also its more comprehensive and disciplined predecessor[5] to complete an intriguing, informative and enjoyable twin-set as a companion to Ian Fraser's popular retrospects.

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Postgraduate medicine. 5th ed. By I J T Davies. (pp 630. £24.95). London: Chapman & Hall, 1991.

It was with keen anticipation that I set aside an evening to look through the fifth edition of Postgraduate medicine. As with previous editions, the target readership is amongst those preparing for the MRCP diploma. I remember well using a copy of the third edition in my own examination preparation. At that time I found this single author survey of internal medicine a useful source of revision. By skimming over the straightforward bits, there was enough space to explain in more detail difficult areas of both practical and examination relevance.

The approach in the new edition is the same, though as I looked through it, I was a little disappointed. The endocrinology section seems far from up to date. There is a detailed discussion of the free thyroxine index when, rightly or wrongly, most laboratories have been using kits to measure free thyroxine more or less directly for some time. Does anyone now need to know about the historical terms LATS, when the cause of hyperthyroidism can be attributed to aptly named thyroid stimulating antibodies? The section on the classification of diabetes mellitus was quite at odds with recent definitions.

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In other areas, perhaps reflecting my own more superficial knowledge, I found less to argue with. But I do think in a book aiming to highlight topics which will feature in the MRCP examination, more than a brief paragraph on AIDS would be useful. Having made these criticisms there is much to enjoy in the slightly idiosyncratic approach in this book. It will remain popular amongst MRCP candidates when they need a break from the large standard textbooks or when a concise monograph on a specific area is not available.

PM BELL

Health for the farmer. By C F Stanford. (pp 97. No price stated). Ipswich: Farming Press Books, 1991.

This book is of major and local importance. Its subject is occupational health and safety for farmers, their wives, children and employees. It will be enlightening to them and informative to doctors and nurses who practise in the farming community. That means all doctors and nurses, predominantly agricultural as the country is. The book is practical and comprehensive. The chapters on farming accidents, climatic risks, harmful inhalants, and toxic chemicals are specially valuable. There should be no children drowning in slurry, or in swimming pools, no more unguarded circular saws, no more low electric cables over farm-yards to catch on diggers, no more tractors without protective cabs, if Doctor Stanford's book is read and studied. Heat exhaustion does occasionally occur in Ulster in hard-working farmers in a long hot summer and the advice is good. The care of children is emphasised. Farmers' wives are warned to take no part in lambing, especially when pregnant, because of the toxoplasmosis risk to the baby and the mother. Trichinosis is mentioned, not a stranger to Ulster. There was an epidemic in the Ballymena district in 1945, with 705 cases and one death. It is lucky that hydatidosis (*Echinococcus granulosus*) in Ulster is in a horse – dog cycle and not a sheep – dog cycle. Otherwise we might have had the disaster experienced by Iceland, New Zealand and the Falklands. Perhaps after studying this book farming families will stop drinking their own unpasteurised milk; unfortunately it stil goes on. Histoplasmosis is mentioned but this reviewer tried for some years to identify histoplasmosis in patients with inexplicable spotty calcification in liver and spleen but was unsuccessful. It would be worth emphasising adequate shuttering in excavations, and avoiding unstable old walls. Altogether Doctor Stanford's book is of first importance for health and safety in agriculture. He has done his country a service.

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